

Chapter 5

Environmental Consequences

Chapter 5

Environmental Consequences

This chapter includes descriptions of the potential environmental and social impacts of the proposed Virginia Avenue Tunnel Reconstruction Project. Mitigation measures are also presented in this chapter for those potentially unavoidable effects considered to be adverse or negative.

Alternative 1, or the No Build, does not contemplate any major repairs or rehabilitation of the tunnel in the near future. However, given its 100-year plus age, the tunnel could eventually require emergency or unplanned repairs at some point in the future to maintain commercial freight movements and protect the safety of railroad personnel and the public. For the purposes of analyzing the impacts of the Project, Alternative 1, the No Build Alternative, provides a baseline condition with which to compare the consequences associated with the proposed action.

Because the Project is essentially rebuilding existing infrastructure, most of the anticipated impacts described in this chapter would be related to or occur during construction. However, some post-construction impacts are anticipated with the Build Alternatives. Therefore, within each topic covered in this chapter, the anticipated impacts of the Alternatives are divided into construction and post-construction impacts.

Alternatives 2, 3 or 4 would reconstruct the Virginia Avenue Tunnel in generally the same location and alignment as the existing tunnel. Their construction limits of disturbance (LOD) would be very similar and upon completion, each of the three Build Alternatives would increase the number of tracks within the tunnel from one to two, matching the number of tracks on both the west and east sides of the tunnel, and provide a vertical clearance that would allow double-stack intermodal container freight trains to operate in the tunnel. The differences between Alternatives 2, 3 and 4 are slightly different alignments and how train operations would be conducted during construction. Following construction, freight train activities through Virginia Avenue Tunnel and the District would operate with greater efficiencies due to the provision of two railroad tracks within the rebuilt tunnel. Regardless of the Build Alternative, the Project provides the opportunity to change the Virginia Avenue SE streetscape in keeping with the needs and desires of the District and the community. Upon completion, the portals would remain viewable from very few vantage points (i.e., only at few location at the west and east portals as they are today).

Many of the Project impacts disclosed in this chapter are common to the Build Alternatives and are predicted to occur if any of them is selected as the preferred alternative in the Federal Highway Administration (FHWA) Record of Decision. Therefore, for descriptive purposes and to avoid repetitive text, the impact descriptions are not divided by alternative. Where there are differences among the Build Alternatives, those differences are noted.

5.1 Land Use

5.1.1 Construction Impacts

Most of the construction-period limits of disturbance (LOD) needed by the Build Alternatives would be within public rights-of-way owned by or under the jurisdiction of DDOT, or property owned by CSX (rail right-of-way and Jersey Rail Yard). For instance, the majority of the LOD encompasses Virginia Avenue SE between 2nd and 9th Streets SE because the existing tunnel is located within this street's right-of-way. The parts of the LOD not included in these categories are the Marine Corps Recreation Facility, located on the 600 block of Virginia Avenue SE, and the Virginia Avenue Park, located between 9th and 11th Streets SE within the path of Virginia Avenue SE. These are federal properties that are owned by the U.S. Department of Defense and the NPS, respectively. The park is owned by NPS, however, it is under the jurisdiction of the District, meaning it is maintained and operated by the District, specifically the DC Department of Parks and Recreation (DPR) (see Section 4.12 for further information).

Each of three Build Alternatives would require an LOD to some extent within NPS and Marine Corps properties. The LOD within the Marine Corps property may be roughly the same under each of three Build Alternatives (see Section 3.3.1.1). The LOD within Virginia Avenue Park would be the same for Alternatives 2 and 3, but smaller under Alternative 4. None of the Build Alternatives would require the displacement or relocation of any business or residence. The LOD may also include the following additional NPS-owned properties, all of which are triangular-shaped, and are located along Virginia Avenue SE. Unless otherwise noted, most of these properties are part of the roadway network right-of-way under the jurisdiction of DDOT:

- Reservation 122 is located along Virginia Avenue SE between 4th and 5th Streets SE. The majority of this property is used as roadway. However, a portion of Reservation 122 is a triangular-shaped grassy lawn with a perimeter sidewalk and contains several young trees. The lawn would not be part of the LOD.
- Reservation 122A is a relatively small area of land located along Virginia Avenue SE between 4th and 5th Streets SE, and is used for the 6th Street off-ramp embankment.
- Reservation 123 located on the north edge of Virginia Avenue SE between 5th and 7th Streets SE. The portion inside the LOD is used for the I-695 embankment. The remainder of this reservation is used for I-695.
- Reservation 124 is located along Virginia Avenue SE just west of 7th Streets SE. It is used as part of the Marine Corp Recreation Facility, and is under the jurisdiction of the Marine Corps.
- Reservation 124A is used as a traffic island for the intersection of Virginia Avenue SE and 7th Street SE.
- Reservation 127 is located within the 11th Street Bridges right-of-way and Virginia Avenue Tunnel's east portal.

Alternative 1 does not involve construction in the short-term and therefore, would not have a LOD and would not require land use approvals for construction.

5.1.2 Post-Construction Impacts

5.1.2.1 Right-of-Way Requirements

Each of the three Build Alternatives proposes a rebuilt Virginia Avenue Tunnel alignment that is, at least partially, outside of the existing tunnel alignment but still largely within the public right-of-way of Virginia Avenue SE.

None of the Build Alternatives would require the acquisition of private land. Similar to the project needs within the public rights-of-way, to a limited extent, each of three variations of the rebuilt tunnel would fall outside the existing tunnel alignment under the park. Of the three Build Alternatives, Alternative 3 would require the greatest adjustment because under this alternative, the reconstructed tunnel would be split into two separated tunnels between 9th Street SE and the new east portal located just beyond 12th Street SE. Nevertheless, as is described in Section 5.11, post-construction the park would be unaffected by having a rebuilt tunnel underneath it, similar to how the existing tunnel does not affect the enjoyment of the park.

The reconstructed tunnel under Alternative 3 would be partially located under Marine Corps Recreation Facility. As described in Section 5.12, the recreational activities within the Marine Corps facility would be unaffected by the Alternative 3 tunnel beneath the surface of the property. The reconstructed tunnel under the other two Build Alternatives would not be located within the Marine Corps property, though some utilities may be relocated there (see Section 5.14).

Under Alternative 1 (No Build), Virginia Avenue Tunnel could require a major repair or rehabilitation, or potentially a complete rebuild of the tunnel, at some point in the future. When that occurs, the long-term land use requirements may be similar to those under the Build Alternatives.

5.1.2.2 Land Use Development Trends

Various land use plans for Capitol Hill and the Barracks Row/ Eighth Street Corridor propose to keep these areas vibrant without any substantial changes in development. The *Barracks Row Main Street Initiative*, mentioned in Section 4.1, focuses on attractive streetscapes to attract a vibrant retail mix. Moreover, for the Capitol Riverfront area, an active mixed-use higher-density district is also envisioned, and is well underway. Under the Build Alternatives, Virginia Avenue Tunnel would basically remain at its current location and largely out of view from the perspective of the surrounding community. Also, the Project would not influence these development trends because it would not provide the amenities typically needed to encourage land use development. Such amenities include the provision of transportation access and infrastructure to designed improve transit riders, pedestrian or motorist experience at an area targeted for development. Conversely, the Project would not take away amenities explicitly or implicitly meant to support current development trends following completion of construction.

These factors extend to Alternative 1, which like the Build Alternatives, would have no effect on development trends in the vicinity of the LOD.

5.1.2.3 Land Use Plans, Policies and Controls

Comprehensive Plan for the National Capital, Federal and District Elements

All of the alternatives, including Alternative 1, would be consistent with the goals of the Comprehensive Plan for the National Capital, Federal and District Elements as described in Section 4.1.2.2.

With respect to the Comprehensive Plan land use goals, none of the Alternatives would affect land resources at or surrounding the LOD, which could be used to “foster goals to protect the health, safety, and welfare of District residents and businesses [and] to sustain, restore, or improve the character and stability of neighborhoods.” The Alternatives would not preclude any property owner (public or private) from fully using his or her land in accordance with applicable land use plans and regulations.

Each of the Alternatives would be consistent with the other relevant goals identified in Section 4.1.2.2, under transportation, recreation, environmental protection and urban design. For instance, each of the alternatives would maintain the surface transportation network and are therefore, consistent with the transportation goals. In addition, upon completion of the Project, Virginia Avenue Park would be restored, and the Build Alternatives would enhance the connectivity between parks for pedestrians and cyclists. Finally, the Build Alternatives provide opportunities to improve Virginia Avenue SE, potentially with urban goals in mind. Improvements to Virginia Avenue SE were specifically mentioned under urban design goals for the Near Southeast Area.

Subarea Plans

The Build Alternatives would support the relevant recommendations from the Subarea Plans by making Virginia Avenue SE into a more pedestrian and cycling friendly facility, thereby supporting mixed-use development and enhancing a sense of place, which are important elements in the subarea plans. The subarea plans are also cognizant of preserving the historical context of Capitol Hill. As described in Section 5.11, the L’Enfant Plan of the City of Washington and the Capitol Hill Historic District would not be affected by the completion of the rebuilt Virginia Avenue Tunnel.

Mid-Atlantic Rail Operations Studies

The Build Alternatives would support the *Mid-Atlantic Rail Operations –Studies* (MAROPs Phase I and II). MAROPs Phase I and II recommended the reconstruction of the existing tunnel and adding additional track to address the bottleneck in the freight rail network, which would meet the freight transportation demands over the next decades. Any of the Build Alternatives would accomplish this recommendation and remove the freight rail system bottleneck at the existing

tunnel. The Build Alternatives would also allow more capacity for the rail line due to the tunnel's accommodation of double-stack intermodal container freight trains. Alternative 1 would not be consistent with MAROPs Phase I and II because it would not remove the bottleneck. Additionally, Alternative 1 would not preclude future emergency or unplanned repairs or reconstruction of the tunnel.

Anacostia Waterfront Initiative

None of the Alternatives would preclude the implementation of any of the developments and transportation projects identified in the Anacostia Waterfront Initiative (AWI). These projects are meant to improve community connectivity, in addition to other goals, such as creating a vibrant mix of residences and commercial and cultural activities. The importance of connectivity is discussed in *Extending the Legacy: Planning America's Capitol for the 21st Century*, and to some extent in the *Anacostia Waterfront Framework Plan*. The relocation of the east portal by approximately 330 feet east (this length would be within a tunnel) and future DDOT plans to convert the Southeast Freeway between 11th Street SE and Barney Circle into an urban boulevard, would allow DDOT to connect 12th Street between K and M Streets SE. This would enhance the connectivity between the waterfront area east of the 11th Street SE and the larger Capitol Hill community. The Alternatives would maintain the current level of connectivity at the surface level, and not interfere with any of the AWI projects.

Long-Range Transportation Plan and Transportation Improvement Program

The Financially Constrained Long-Range Transportation Plan (CLRP) and the Transportation Improvement Program (TIP), both of which are prepared by the Metropolitan Washington Council of Government (MWCOC), identified some major transportation improvement projects in the general vicinity of the LOD. None of the Alternatives would prevent implementation of these projects, which include the 11th Street Bridges (now under construction) and the South Capitol Street Corridor project, which includes reconstruction of the Frederick Douglas Bridge. The CLRP and TIP also identified bicycle and pedestrian projects meant to improve connectivity between neighborhoods and recreational resources. The Build Alternatives would provide the opportunity to enhance Virginia Avenue SE, a benefit that would not occur under Alternative 1. Under the Build Alternatives, an enhanced Virginia Avenue SE could include a bicycle facility to improve the connectivity between Garfield Park and the riverfront.

Major Projects in Project Vicinity

In addition to the 11th Street Bridges and the South Capitol Street Corridor Projects, another major project in the general vicinity of the LOD is the Marine Corps' plans to relocate bachelor quarters located on I Street to another location in the same neighborhood. None of the alternatives would affect the Marine Corps decision in identifying the site for the new quarters.

5.1.2.4 Zoning

According to the DC Department of Consumer and Regulatory Affairs (DCRA), the Project, regardless of the Build Alternative, would not require a zoning review or approval (DCRA, February 14, 2013). Because the Project would not influence long-term land use trends (see Section 5.1.2.1), it would not influence others to seek changes in zoning of any parcel along the LOD.

5.1.3 Mitigation Measures

The Project sponsors would continue working with DDOT, DPR, the Marine Corps and NPS in obtaining construction-period and post-construction approvals as required by the specific Build Alternative.

5.2 Farmland

5.2.1 Construction Impacts

As described in Section 4.2, no farmlands are located at or near the LOD. Therefore, impacts to farmland cannot occur under any of the Alternatives.

5.2.2 Post-Construction Impacts

None of the Alternatives would lead to or encourage the development of urban agriculture at or near Virginia Avenue SE. The land use plans and policies described in Section 4.1 do not call for the development of urban agriculture, which normally requires favorable market conditions, such as the abundance of vacant land at relatively low cost, and a weak demand for urban development. These market conditions do not exist in the general vicinity of Virginia Avenue SE or elsewhere in the District.

5.2.3 Mitigation Measures

No mitigation measures are required.

5.3 Social and Community Conditions

5.3.1 Construction Impacts

5.3.1.1 Neighborhoods and Communities

Other than impacts from unplanned or emergency repairs, Alternative 1 would maintain the existing community characteristics described in Section 4.3.

Under any of the three Build Alternatives, general temporary construction impacts are expected and changes in traffic patterns would be prescribed as a result of street closures during the construction period. The potential temporary impacts to ambient air quality, noise

and vibration levels due to construction are discussed in Sections 5.6, 5.7 and 5.8, respectively. Information on how traffic, bicycle, and pedestrian mobility would be maintained in and around the LOD during construction, or the application of the maintenance of traffic (MOT) plan, is provided in Section 3.3.1.4. The potential traffic impacts from the implementation of the MOT are discussed in Section 5.15.3. Details of the construction-period impacts to social and community patterns and resources due to implementation of the MOT plan are described below.

Construction along Virginia Avenue would not sever access between the neighborhoods north and south of I-695 for motorists, pedestrians, and cyclists because, as noted in Section 3.3.1.4, Virginia Avenue SE crossings at 3rd, 4th, 5th/6th, 7th, and 8th Streets (locations where vehicular, pedestrian, and cycling access are currently available through I-695) would remain open. Nevertheless, a construction site could discourage travelers from maneuvering through the construction area due to possible inconveniences, perceived or real, especially if the traveler is new to the area. Also, east-west movements along Virginia Avenue SE would be curtailed substantially during Phase 1 of the MOT plan and cut-off completely during Phase 2 of the plan. With proper wayfinding, public outreach and possible additional outreach from private retailers or business associations, this effect could be minimized or eliminated. Access to residential communities along Virginia Avenue SE would be maintained throughout construction. Capitol Quarter would have temporary entrances on 3rd and 4th Streets SE, and an access road for emergency vehicles would be provided for the Capper Senior Apartments. Based on the traffic impact studies conducted for this Project that evaluated the MOT plan, no substantial delays to vehicular access are expected to occur and that overall mobility would be maintained (see Section 5.15.3). However, certain trips would take longer to complete, in particular those originating from the 6th Street off-ramp heading towards land uses on the south side of Virginia Avenue SE. These trips would require a more circuitous route (detoured to the Virginia Avenue SE/I Street SE on the north side of I-695) for completion.

5.3.1.2 Public Facilities and Services

Similar to what is described in Section 5.3.1.1, Alternative 1 would maintain the existing level of connectivity with the public facilities and services described in Section 4.3.

The implementation of the MOT plan under each of the Build Alternatives as described in Section 3.3.1.4 would ensure that all schools, and religious, social services and community facilities near the LOD are accessible by auto, walking, and cycling. Access would be maintained to the Eagle Academy Public Charter School, which is located near the LOD. Regardless of the Build Alternative, construction of the Project would not affect access to religious worship or other services offered at the St Paul AUMP Church, which is located adjacent to the LOD. Access to the church for parishioners would be available at all times, and the Project does not require temporary parking displacements along 4th Street SE, I Street SE and K Street SE, places where churchgoers are likely to use to park to attend service. In addition, unless required for a special reason and permitted by the District, construction would not occur on Sundays, and

therefore, construction activities should not interfere with or disrupt regular weekly religious services.

Although the future National Community Church site has yet to be developed, this parcel located on the 700 block of Virginia Avenue SE would be subject to the effects of construction under any of the Build Alternatives. A development timetable for this property has not been communicated. However, the owner is aware of the Project and may wait for plans for the tunnel to be finalized to initiate development.

The MOT plan would also ensure that emergency service vehicles, including those coming from Engine 18 Fire Station on 8th Street SE, would be unimpeded when responding to calls. All north-south routes would be open throughout construction. The temporary access provisions that would be provided at Capitol Quarter, Capper Senior Apartments and other properties would be designed to accommodate emergency vehicles.

Maintaining safety during construction is a concern of the project sponsor and the surrounding community. Safety and security measures as described in Section 3.3.1.5 would be implemented during construction. Motorists, pedestrians and cyclists would be provided with safe passage along the cross streets of Virginia Avenue SE. The measures would include secure fencing, at least eight feet high, along the perimeter of the construction area, including around the areas with trains running in a protected trench and at cross streets where vehicles, pedestrians, and cyclists would be allowed to cross the construction zone.

5.3.2 Post-Construction Impacts

5.3.2.1 Neighborhoods and Communities

Alternative 1 (No Build) could result in an emergency or unplanned major repair or rehabilitation that could cause social impacts in the form of interruption of community cohesion.

The Build Alternatives would improve the streetscape of Virginia Avenue SE, which would include improved sidewalks, new bicycle facilities, and more landscaping, would be a benefit to the surrounding neighborhood, allowing a pleasant pedestrian and cycling experience.

The Capitol Hill neighborhood, continuing its historic preservation, would focus on continued preservation as well as infill development along Pennsylvania Avenue and the Eastern Market area as mentioned in the *Pennsylvania Avenue, SE Corridor Development Plan*. The Near Southeast neighborhood and Capitol Riverfront area will incorporate more housing, such as the completion of the Capper/Carrollburg redevelopment and planned residences at the Yards, and the addition of more commercial venues. Once completed, a rebuilt tunnel under any of the build alternatives would not conflict with these plans.

5.3.2.2 Public Facilities and Services

Alternative 1 could result in an emergency or unplanned major repair or rehabilitation that could cause social impacts in the form of interruption of access to community, religious, and social-services facilities.

Upon completion of construction under the Build Alternatives, police, fire and emergency services would access properties along Virginia Avenue SE the same way as it does today. Similarly, access to community, religious, and social-services facilities in the general vicinity of the LOD would revert back to their pre-construction conditions as described in Section 4.3.

5.3.3 Environmental Justice

As described in Section 4.3.4, Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations, requires federal agencies to take appropriate and necessary steps to identify and address disproportionately high and adverse human health or environmental effects of their actions on minority and low-income communities or populations, and directs federal agencies not discriminate on the basis of race, color, or national origin.

Section 4.3.4 identified one Environmental Justice (EJ) population near the Project's LOD: Capper Senior Apartments located within the block immediately south of Virginia Avenue SE between 5th Street SE and the Marine Corps Recreation Facility (turf field).

The residents of Capper Senior Apartments (Capper) would be subject to the construction effects of the Project in the same manner as other residents who live near or adjacent to the LOD. However, not all Capper residents would be affected equally. Those living in apartments facing K Street SE (south facing), and to a lesser extent those living in apartments facing 5th Street SE (west facing) and the MarineCorps turf field (east facing), would not be subject to many of the construction effects of the Project. The inconvenience to Capper residents would only occur during construction. Once completed, conditions prior to construction would return.

In terms of access and mobility, provisions would be made during construction to ensure access to Capper is maintained for residents, visitors, staff, para-transit and emergency response vehicles. This access would be part of the MOT plan described in Section 3.3.1.4. The MOT would include a 5th/6th Street SE crossing of Virginia Avenue SE for vehicles, bicyclists and pedestrians, including those who are wheelchair dependent. This would be the same provision as other cross streets along the Virginia Avenue SE.

Despite the access provisions, Capper would be located adjacent to the future construction site or LOD, and construction activities, which may produce airborne dust emissions, construction-related noise levels and other construction effects, could be a concern to residents and staff, especially for those living in the apartments facing Virginia Avenue SE. Construction dust should not pose a major problem because of the dust control measures that would be employed (see Section 5.5.4) and the fact Capper has a centralized HVAC system. However,

Capper management has noted that many residents prefer at times to open their apartment windows and not use the air conditioning. For those living in apartments fronting or near Virginia Avenue SE, they may be discouraged from opening their windows if construction activities that may produce dust emissions are occurring near the building.

Construction noise would be a concern. As noted in Section 5.6.2, the predicted noise levels at the apartments due to construction activities would exceed Construction Noise Impact Criteria. Again, those residents living in apartments fronting Virginia Avenue SE may be discouraged from opening their windows if activities that produce construction-related noise levels are occurring near the building.

Certain construction activities have the potential to cause vibration levels in buildings near the LOD to be of human annoyance or may cause building damage (see Section 5.6.2 for further information). This potential impact could apply to the Capper building, and the mitigation measures described in Section 5.6.3 would apply.

Visually, those Capper residents with existing views of Virginia Avenue SE would be subject to a construction site for 30 to 66 months, depending on the Build Alternative and other factors. A rendering of this view is provided in Section 5.13. Under Alternatives 2 and 4, those residents living on the upper floors may be able to see temporary train operations within the runaround track (Alternative 2) or open trench (Alternative 4).

Other potential construction-related affects to soils, water resources, vegetation and wildlife, historic resources and parks as described in Sections 5.8, 5.9, 5.10, 5.11 and 5.12, respectively, would not apply to Capper or Capper residents. Utility disruptions may occur, but as noted in Section 5.14, Capper management and residents would be informed of utility disruptions. If possible (i.e., proper approvals are obtained), utility disruptions would be scheduled to have the least impact to daily activities, such as occurring at late night to early morning.

In summary, construction of any of the Build Alternatives would pose a concern to Capper residents, especially to those living in apartments facing Virginia Avenue SE. They are seniors (at least 62 years of age) and spend most of the day in their apartments. Nevertheless, the construction effects on the Capper residents would not be considered a disproportionately high and adverse impact in the context of EO 12898 because (1) the Project cannot avoid reconstructing Virginia Avenue Tunnel along generally same alignment without conducting construction along Virginia Avenue SE that involve the use of heavy equipment for an extended period of time (30 to 66 months depending on the Build Alternative and other factors); and (2) other residents living near the LOD would experience the same construction impacts.

The potential construction impacts on the Capper Senior Apartments and its residents, visitors, and staff are unavoidable given the Purpose and Need of the Project, and the limited set of reasonable alternatives to address them (see Chapter 3). Therefore, communication with residents, management and staff would be important to minimize the construction effects on residents. To ensure that residents were apprised of the status of the Project and could participate in outreach activities, Project briefings were held at the apartments and with Capper

management. In addition, because public information meetings 2, 3, and 4 (see Section 6.2) were held at locations beyond walking distance of many seniors, the Project provided shuttle bus service for the residents. This outreach would continue as the Project moves to construction (see Section 5.3.4).

5.3.4 Mitigation Measures

Measures to mitigate the temporary effects to ambient air quality, noise, and vibration conditions at or near the LOD from construction activities are described in Sections 5.5.3, 5.6.4 and 5.7.4, respectively. These same measures would apply to the Capper Senior Apartments and St. Paul AUMP Church. In addition, the MOT plan includes measures specifically related to the special transportation needs of the Capper Senior Apartments. Among these needs include provisions for para-transit, emergency response vehicles and visitation by residents' family and friends. Addressing these needs would involve providing temporary driveways.

As described throughout this chapter, a community outreach program would be established during construction. Through this outreach program, communication with both the residents of Capper Senior Apartments would remain open to apprise them about the status of construction, especially if something may affect their daily activities. In particular, Capper management would be informed of construction activities near the building that have the potential to cause an increase in noise and vibration levels. Information sheets or flyers about construction activities would be produced and given to Capper management for distribution to residents.

5.4 Economic Conditions

5.4.1 Construction Impacts

5.4.1.1 Employment

Other than impacts from unplanned or emergency repairs, Alternative 1 would not affect or provide additional employment to the local economy.

The Build Alternatives could provide about 200 construction-related jobs on any given day throughout the duration of construction. This is in addition to up to about 35 supervisory personnel on any given day. Many of these jobs may be filled by the local labor force.

5.4.1.2 Commercial

Other than impacts from unplanned or emergency repairs, Alternative 1 would maintain the existing economic conditions described in Section 4.3.

The implementation of the maintenance of traffic (MOT) plan under the Build Alternatives as described in Section 3.3.1.4 would ensure that all businesses near the LOD are accessible by auto, walking and cycling. Based on the traffic impact studies conducted for this Project, no

substantial delays to vehicular access would occur. With the exception of Dogma (a dog kennel), located at the corner of Virginia Avenue SE and 9th Street SE, within the LOD Virginia Avenue SE does not have commercial businesses with storefronts directly facing the street. Most of the commercial businesses near the LOD have their storefronts on Barracks Row (8th Street). The other businesses near the LOD have storefronts on L and M Streets SE. None of these storefronts would be affected by any of the Build Alternatives. The access to Dogma would be moved to 9th Street SE, outside of the LOD.

The MOT plan would require, however, the temporary displacement of on-street parking (see Section 5.15.4). Most of these impacts would occur on Virginia Avenue SE, in particular in the section between 2nd and 5th Streets SE, in an area with no commercial businesses along the street. In Phase 2 of the MOT plan, eastbound traffic exiting the 6th Street off-ramp would be detoured to the existing westbound Virginia Avenue SE / I Street SE, which would be converted to two-way operations between 6th and 8th Streets SE, and metered on-street parking, would be displaced. Because they are metered, these parking spaces are generally used by those living outside of the community. Some of the spaces, especially the 18 spaces located on the 700 block of I Street SE / Virginia Avenue SE, are most likely largely being used for patrons of Barracks Row or the adjacent shopping corridor along 8th Street SE. The Phase 2 MOT parking displacement would result in fewer public parking spaces in close proximity to Barracks Row. Off-street metered parking is available underneath I-695 on 8th Street SE, and on-street metered parking is available on 8th Street SE and adjacent streets. Residential Zone 6 parking is available on adjacent streets (non-Zone 6 residents may park for short periods). As a commercial district, Barracks Row does become extremely busy at times and finding nearby parking could be difficult. The displacement of the 18 spaces on the 700 block of I Street SE and others further west, which are likely being used by Barracks Row patrons, would make finding parking a more difficult. However, the temporary displacement of the parking to the overall economic /commercial conditions along 8th Street is not expected to be noticeable. Despite the availability of parking noted above, they would not by themselves support the number of businesses on Barracks Row. Much of the business patronage comes from those living within walking distance and use a form of transportation other than a private vehicle, such as Metrorail (the Eastern Market Metrorail Station is located nearby), Metrobus, and the DC Circulator (see Section 4.15.5).

5.4.2 Post-Construction Impacts

5.4.2.1 Employment

Under Alternative 1 (No Build), an emergency or unplanned major repair or rehabilitation could result in the creation of short-term construction jobs.

In the long-term, the Build Alternatives would not produce additional employment other than what is needed for regular maintenance.

5.4.2.2 Commercial

Under Alternative 1 (No Build), an emergency or unplanned major repair or rehabilitation could result in economic impacts in the form of disruption of access to businesses.

Upon completion of construction under the Build Alternatives, the economic conditions in the general vicinity of the LOD would revert back to their pre-construction conditions as described in Section 4.4. For instance, because Virginia Avenue SE would be restored at the end of construction, the Project would not likely have any either positive or negative impact on long-term property values in the general vicinity of Virginia Avenue. The existence of a rebuilt Virginia Avenue Tunnel would not likely affect market conditions in the general vicinity of Virginia Avenue SE. Upon completion of the tunnel, it would revert back to being as inconspicuous as it is today to the larger community.

5.4.3 Mitigation Measures

Any adverse economic impact would result from the displacement of parking during construction, in particular the 18 spaces near Barracks Row during the MOT Phase 2 when the westbound Virginia Avenue SE / I Street S between 6th and 8th Streets SE would be converted to two-way traffic. Parking mitigation would be handled through implementation of the MOT plan and is described in Section 5.15.4.3. In addition, the outreach program could be used to communicate (possibly through a website) where metered parking (on- and off-street) is available.

5.5 Air Quality

This section summarizes the results of air quality impact analyses conducted for this Project and whether the Project would meet the requirements of the Final Conformity Rule. An air quality technical report is provided in Appendix D.

5.5.1 Conformity Regulations

EPA adopted regulations for “Determining Conformity of General Federal Actions to State or Federal Implementation Plans” (40 CFR 51 Subpart W and 40 CFR 93, Subpart B). These regulations, commonly referred to as the General Conformity (GC) Rule, apply to all federal actions except for those federal actions which are excluded from review (e.g., stationary source emissions, such as from power plants) or related to transportation plans, programs, and projects under Title 23 of the U.S. Code or the Federal Transit Act, which are subject to Transportation Conformity. The GC Rule applies to all federal actions not addressed by the Transportation Conformity Rule, which applies primarily to federal highway and transit projects.

The GC Rule is used to determine if federal actions meet the requirements of the Clean Air Act (CAA) and the applicable *State Implementation Plan* (SIP) by ensuring that air emissions related to the action do not:

- Cause or contribute to new violations of a National Ambient Air Quality Standards (NAAQS);
- Increase the frequency or severity of any existing violation of a NAAQS; or
- Delay timely attainment of a NAAQS or interim emission reduction.

A conformity determination under the GC Rule may be required if the federal agency determines that the action will occur in a nonattainment or maintenance area. The GC Rule would apply if the action is not included in the federal agency's "presumed to conform" list; the emissions from the proposed action are not within the approved emissions budget for an applicable facility; and the total direct and indirect emissions of a pollutant (or its precursors) are at or above the *de minimis* levels established in the General Conformity regulations. As described in Section 4.5.4, the National Capital Interstate Air Quality Control Region, which is where the LOD is located, is classified as a maintenance area for carbon monoxide (CO), a nonattainment area for particulate matter of less than 2.5 microns (PM_{2.5}), a marginal nonattainment area for ozone.

An action will be required to conform to the applicable SIP for each pollutant that exceeds the *de minimis* emissions threshold provided in 40 CFR 93.153(b). In the general vicinity of Virginia Avenue Tunnel, the applicable *de minimis* emission thresholds are:

- 100 tons per year for CO
- 100 tons per year for PM_{2.5}
- 100 tons per year for sulfur dioxide (SO₂)
- 50 tons per year for volatile organic compounds (VOC)
- 100 tons per year for nitrogen oxides (NO_x)

SO₂ was included because it is a precursor to PM_{2.5} formation. VOC and NO_x are included because they are ozone precursors. A 50 tons per year limit was used for VOC because the District is part of the ozone transport region, which is a multi-state region that works together to implement regional solutions to the ground-level ozone problem in the Northeast and Mid-Atlantic regions.

The *de minimis* emission levels are applicable to both the operational and construction phases of the proposed Project.

5.5.2 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 would not result in construction impacts on air quality. The discussion provided in the Construction Impact section for Air Quality focus exclusively on the three Build Alternatives.

General Conformity Annual Emissions Analysis

Under the GC Rule, direct and indirect construction phase annual emissions must be compared to the *de minimis* thresholds. As such, a quantitative analysis was conducted to estimate the amount of annual emissions generated by the construction of each of Build Alternatives.

The following activities associated with the construction of the project would generate air emissions within and near the major construction areas:

- Excavation, demolition, and grading;
- Handling and transport of construction material and debris;
- Operation of heavy-duty diesel-powered construction equipment; and
- Operation of heavy-duty diesel trucks for transport of construction materials within construction areas and on adjacent roadways.

Emissions generated by construction activities and truck trips were estimated on an annual and monthly basis for the entire construction period, and potential air quality impacts were estimated during peak construction periods. Total annual estimated emissions generated during the project's construction period are provided in Tables 5-1, 5-2 and 5-3 for Alternatives 2, 3 and 4, respectively. The values for CO, NO_x, PM_{2.5}, SO₂ and VOCs presented in these tables are at their peak on-site emissions during each analysis year, in addition to their peak off-site truck travel emissions for each year. As noted in these tables, the values (for each of three Build Alternatives) are substantially less than the GC *de minimis* thresholds, which are also noted on each table.

Table 5-1
Total Annual Emissions from Construction Equipment and Activities
under Alternative 2

Pollutant	GC Rule de minimis Threshold	Emissions (Tons/Year)			
		2013	2014	2015	2016
Carbon Monoxide	100	2.44	4.16	5.34	0.73
Nitrogen Oxides	100	5.26	7.95	10.76	1.68
Particulate Matter (< 2.5 microns)	100	0.41	0.94	1.52	0.23
Sulfur Dioxide	100	0.01	0.01	0.02	0.00
Volatile Organic Compounds	50	0.36	0.61	0.80	0.13

Table 5-2
Total Annual Emissions from Construction Equipment and Activities
under Alternative 3

Pollutant	GC Rule de minimis Threshold	Emissions (Tons/Year)			
		2013	2014	2015	2016
Carbon Monoxide	100	4.27	3.87	4.40	2.78
Nitrogen Oxides	100	9.11	8.14	9.37	5.67
Particulate Matter (< 2.5 microns)	100	0.77	0.82	1.05	0.58
Sulfur Dioxide	100	0.01	0.01	0.01	0.01
Volatile Organic Compounds	50	0.64	0.61	0.70	0.41

Table 5-3
Total Annual Emissions from Construction Equipment and Activities
under Alternative 4

Pollutant	GC Rule de minimis Threshold	Emissions (Tons/Year)			
		2013	2014	2015	2016
Carbon Monoxide	100	1.28	3.83	3.14	3.63
Nitrogen Oxides	100	2.87	7.84	5.79	7.00
Particulate Matter (< 2.5 microns)	100	0.23	0.76	0.57	0.83
Sulfur Dioxide	100	0.01	0.01	0.01	0.01
Volatile Organic Compounds	50	0.20	0.58	0.41	0.48

In summary, construction phase emissions under each of the Build Alternatives are not predicted to exceed the GC Rule's *de minimis* emission thresholds. As such, air quality impacts from construction of any of the Build Alternatives would not be subject to a conformity determination.

Localized On-Site Dispersion Modeling Analysis

Construction activities have the potential to affect ambient air quality levels primarily within 200 to 300 feet of these activities, as pollutants disperse beyond the point of emissions. Therefore, an on-site air quality dispersion modeling analysis was conducted to determine whether these construction phase emissions would adversely affect nearby sensitive land uses, which may result in exceedances of the NAAQS. This analysis is not required under the GC Rule. It was conducted to address community concerns regarding construction emissions.

The dispersion analysis included the criteria pollutants associated with construction operations, as well health risks associated with the emissions of mobile source air toxics (MSAT) from diesel equipment. The dispersion modeling focused on nearby sensitive land uses, such as residences.

Because Alternative 2 is predicted to have the highest emission rates during construction, this scenario was used for the dispersion analysis. The dispersion modeling was conducted using the latest version of the U.S. Environmental Protection Agency (EPA) AERMOD atmospheric dispersion model (version 12060) with five consecutive years of meteorological data (2007-2011) from Reagan National Airport, which is located approximately three miles from the LOD. The modeling simulated the atmospheric conditions and predicted pollutant concentrations at nearby sensitive land uses (receptors). Two sets of receptors were included in the analysis: (1) ground-level receptors located along the roadways near the LOD; and (2) actual residences (and one hotel) located in the general vicinity of the LOD.

Table 5-4 displays the highest predicted concentrations for each of the criteria pollutants: CO, nitrogen dioxide (NO₂), PM₁₀ (less than 10 microns) and PM_{2.5}. As shown in this table, the

predicted concentrations are below their respective NAAQS. Therefore, the impacts of criteria pollutants from construction activities are not considered to be a concern.

Table 5-4
Maximum Total Estimated Criteria Pollutant Concentrations at Sensitive Receptors

Pollutant	NAAQS		Concentrations (ug/m ³)		
	Time Period	Standard (ug/m ³)	Background	Max. Est. Impact	Max. Est. Concentration
CO	1-hr	35	4.2	0.6	4.8
CO	8-hr	9	3.8	0.4	4.2
NO ₂	1-hr	188	119	34	153
PM ₁₀	24-hr	150	85	58	143
PM _{2.5}	24-hr	35	28	6	34

Note: ug/m³: micrograms per cubic meter

In summary, pollutant emissions from construction activities, such as excavation, and the operation of construction equipment within the LOD, are not predicted to cause exceedences of the NAAQS at sensitive land uses adjacent to the LOD.

Mobile Source Air Toxics (MSAT) Analysis

An MSAT analysis is not required under the GC Rule. It was conducted to address community concerns regarding this type of construction emissions.

The procedures to estimate cancer risk and the hazard index of toxic pollutants are based on inhalation exposure concentrations outlined in EPA's Human Health Risk Assessment Protocol (HHRAP). The HHRAP is a guideline that can be used to perform health risk assessment for individual compounds with known health effects in order to determine the level of health risk posed by an increased ambient concentration of that compound at a potentially sensitive receptor. The derived health risk values from the HHRAP were used in this analysis to determine the total risk posed by the release of multiple toxic contaminants.

The air toxics emissions were considered as both carcinogens and non-carcinogens. Carcinogenic compounds were evaluated using unit risk factors (URF); non-carcinogenic compounds were evaluated using the reference concentrations for inhalation exposure (RfC) and/or acute inhalation exposure (AIEC). RfC and AIEC were used to estimate non-carcinogenic health effects of substances that are also carcinogens. A conservative cancer threshold of one in one million, as recommended by the EPA for health-risk related assessments, was used in the analysis to determine whether estimated impacts would be considered significant.

The air toxics analysis concluded that the Project's construction period emissions are well within acceptable ranges in terms of potential cancer, chronic non-cancer, and acute health risks. Details of this analysis can be found in the air quality technical report in Appendix D.

On-Site Mobile Source Analysis

An estimate was made of the potential air quality impacts associated with the operation of construction-phase vehicles, which includes trucks transporting soil, debris and construction materials, and personal vehicles of construction workers, on the roadways adjacent to the LOD. This analysis is not required under the GC Rule. It was conducted to address community concerns regarding construction emissions.

The intersection of M Street SE and 8th Street SE was selected for analysis because it is predicted to experience a poor level of service during construction. This intersection is part of proposed truck hauling routes and is adjacent to the Eagle Academy Public Charter School. As shown in Table 5-5, the 1- and 8-hour CO levels predicted for this intersection during construction would be well below the NAAQS.

Table 5-5
Results of CO Analysis at the M Street SE / 8th Street SE Intersection

Pollutant	NAAQS (ppm)	Alternative 1 (ppm)		Alternative 2 (ppm)	
		AM	PM	AM	PM
CO 1-Hour ¹	35	4.8	4.8	4.8	4.8
CO 8-Hour ²	9	4.2		4.2	

Notes ppm: parts per million

¹ 1-Hour results include a background concentration of 4.2 ppm.

² 8-Hour results include a background concentration of 3.8 ppm.

5.5.3 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in potentially similar impacts described under the Construction Impacts for the Build Alternatives. Nevertheless, no long-term impacts related to air quality are anticipated to occur as a result of Alternative 1.

The Build Alternatives are also not expected to result in post-construction impacts to air quality because each would allow the amount of intermodal container freight passing through the District to be moved in fewer trains (see Section 5.15.1). The provision of double railroad tracks in the tunnel, matching the number of tracks on both the east and west ends of the tunnel, would allow more efficient train movements. In addition, none of the Build Alternatives would affect post-construction traffic conditions on surface streets even with modifications to Virginia Avenue SE as a community benefit (see Section 5.15.3). As such:

- The post-construction phase of the Project would not exceed the GC Rule's *de minimis* emission thresholds;
- The post-construction phase of the Project would not cause or exacerbate a violation of the applicable NAAQS for CO and PM_{2.5};
- The post-construction phase of the Project has no potential for any MSAT effects; and

- The post-construction phase of the Project would not affect the level of greenhouse gas emissions.

5.5.4 Mitigation Measures

The Project would comply with local and federal regulations for fugitive dust control and mobile source emissions during construction. Dust control “best practices” would be implemented as mitigation measures during construction to prevent fugitive dust from excavation and other dust-producing activities from affecting areas beyond the construction site. District regulations stipulate dust control and good housekeeping practices, and the following mitigation measures would be used during construction:

- Erecting windscreens between the construction site and dust sensitive land uses, such as residences;
- Use of watering trucks for haul roads, street sweeping for tracking on paved surfaces;
- Use of sprinklers, misters or hoses for wetting down demolition areas;
- Spray exposed soil with water or other dust suppressant to prevent visible dust emissions;
- Stabilize haul roads to reduce windblown dust and dirt deposited on local roads;
- Stabilized construction entrances would be installed to prevent haul trucks from tracking dirt onto paved streets;
- Routinely clean dirt tracked on public roads by using street-sweeper machines;
- Cover all trucks during transport of fill materials or soil, wetting materials in trucks or providing adequate freeboard to minimize dust emissions during transportation;
- Cover loads of hot asphalt to minimize odors to the extent practical;
- For material stockpiles, use of temporary stabilization if inactive for greater than 14 days, and use of tarps over finely-textured materials that are subject to wind borne travel;
- Remove temporary gravel or paving at the completion of construction and restore affected areas; and
- Institute and conduct good housekeeping practices (e.g., routinely collect trash and place in the nearest receptacles or dumpsters), which would also help control against dust emissions dispersing outside the construction area.

In addition to the above dust control measures, best practices would be used to minimize other air pollutant emissions, such as assuring proper equipment operations that would include:

- Turning off the engines of construction vehicles if they are left idling for more than 30 minutes;
- Using appropriate emission-control devices (per EPA regulations) on all construction equipment powered by gasoline or diesel fuel to reduce CO, NOx and particulate emissions in vehicular exhaust;
- Use relatively new, well-maintained equipment to reduce CO and NOx emissions; and
- Use of low or ultra-low sulfur fuels to reduce sulfur emissions.

Stationary equipment that has air emissions, such as compressors, would not be placed in direct proximity to sensitive land uses, such as residences, or where people tend to congregate, such as the Virginia Avenue Community Garden, to the extent feasible.

5.6 Noise

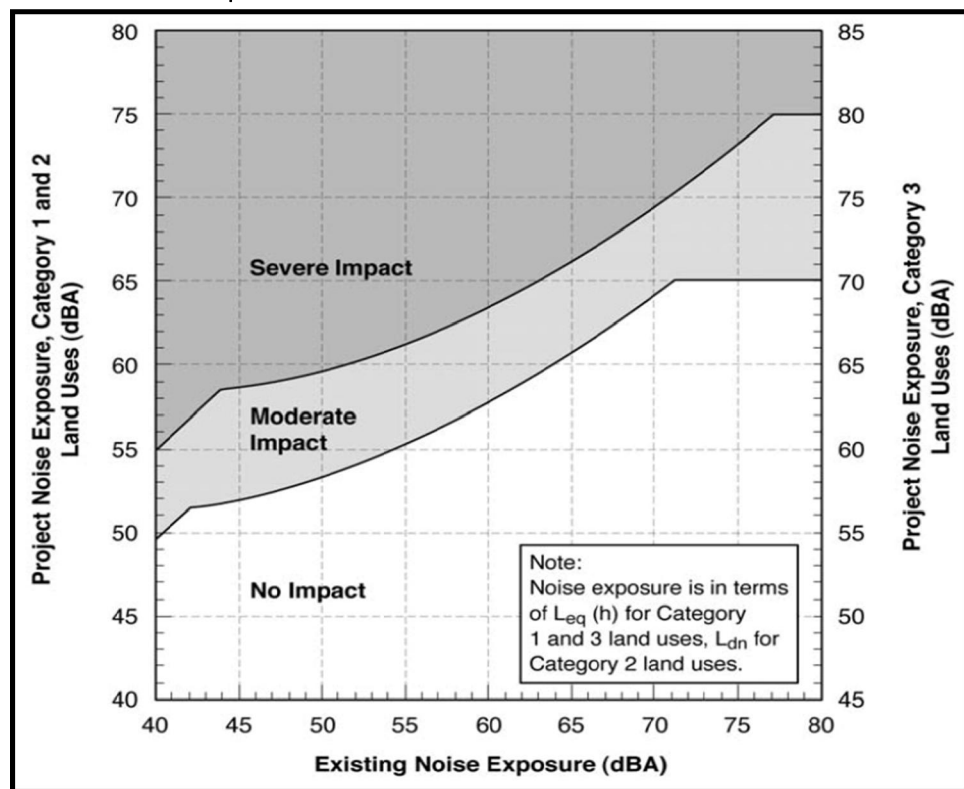
This section summarizes the results of noise impact analyses conducted for this Project. A noise technical report is provided in Appendix E. A description of the characteristics of noise is provided in Section 4.6 and in noise technical report in Appendix E.

5.6.1 Noise Impact Criteria

A noise impact according to FTA procedures is either moderate or severe. The criteria to determine whether the predicted noise generated by a project would cause a moderate or severe noise impact at noise sensitive receptors are illustrated in the enclosed chart, FTA Noise Impact Criteria Chart.

Impacts are assessed based on a combination of the existing ambient noise conditions and the additional predicted noise exposure from the project. The chart shows that the thresholds for determining whether moderate and severe noise impacts would occur are defined by two curves that rise depending on the level of existing noise conditions. The higher the existing conditions, the higher the thresholds are for determining moderate or severe noise impacts. However, at certain points the curves are flat, meaning the impact is determined based on project noise alone, and the existing noise conditions are immaterial.

FTA Noise Impact Criteria Chart



Source: FTA, Transit Noise and Vibration Impact Assessment May 2006

A predicted noise level at a receptor above the upper curve would mean that the project would cause a severe impact, which means that a substantial percentage of people would be highly annoyed by the new noise caused by the project. A severe impact would require the consideration of mitigation to reduce the predicted noise level by a certain amount. A predicted noise level between the two curves indicates that a project is expected to have a moderate impact, which means that the change in the cumulative noise level is noticeable to most people, but may not be sufficient to cause strong adverse reactions. Under a moderate impact condition, other project-specific factors would be considered to determine the magnitude of the impact and the need for mitigation, such as the existing level, predicted level of increase over existing noise levels and the types and numbers of noise-sensitive land uses affected by the project.

5.6.2 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 would not result in construction noise impacts. The discussion provided in the Construction Impact section for Noise focuses exclusively on the three Build Alternatives.

Construction Noise

Noise from construction activities is generated from various construction related sources inclusive of operation of a number of different kinds of equipment and vehicles: backhoes, bulldozers, cranes, concrete mixers, concrete delivery trucks, dump trucks, delivery trucks, frontend loaders, pile drivers and jack hammers. These noise sources are both mobile and stationary. The operation of some types of mobile equipment, such as dozers, scrapers, and graders, are cyclical, meaning they would operate in periods of full power (higher noise) followed by periods of reduced power (lower noise). Trucks on the other hand are a type of mobile equipment that produces a steady noise. Stationary equipment, such as pumps, generators and compressors, produces noise at a single location. They normally operate at a constant noise level and are classified as non-impact equipment. Other types of stationary equipment, such as pile drivers, jackhammers and pavement breakers, produce variable and sporadic noise and produce impact-type noises.

Predictions of outdoor construction noise were made using FHWA's Roadway Construction Noise Model (RCNM). Construction impacts are determined using the FTA Construction Noise Impact Criteria, which are used for the purposes of determining impacts rather than absolute standards that cannot be exceeded. For urban areas with very high ambient noise levels (Ldn greater than 65 dB), a construction impact would occur if Ldn from construction operations exceeds existing ambient conditions by 10 dB. As described in Section 4.6, the existing Ldn measured along Virginia Avenue SE varied between 68 to 73 Ldn for an average of about 70 Ldn. Therefore, a construction noise impact would occur if an Ldn value of 80 dBA is predicted. However, because construction would not be conducted at night, an 80 Leq impact criterion was used. As described in Section 4.6, Ldn includes nighttime conditions.

Noise from construction could vary greatly, and is difficult to predict accurately. For example, the major source of noise during construction is heavy equipment, but they are constantly moving in unpredictable patterns and are usually not stationary for long periods of time. In order to gauge the level of potential noise impacts from the Project, preliminary construction scenarios were developed for each Build Alternative. The scenarios identified the types of equipment likely to be used during construction of the Alternative, and their deployment locations within the LOD. The construction noise analysis assumed that the bulk of the construction would occur during weekday daylight hours when residents who are at home are less sensitive to construction activities, and when other community noise sources contribute to higher ambient noise levels.

Using RCNM, predictions of outdoor construction noise were made at ten exterior receptor sites located various spots. Receptor R-1 is located near a commercial property, the 200 I Street building. The others are located near residential areas, such as Capitol Quarter (R-2 and R-3), Capper Senior Apartments (R-4) and bachelor quarters in the Marine Corp Recreation Facility (R-5 and R-6). The locations of the ten receptors are shown on Figure 5-1. At each receptor, noise predictions were made by type of noise-producing construction activity and by Build Alternative. The construction noise predictions are shown on Table 5-7. The construction noise predictions for Alternatives 2 and 3 are the same, and therefore, these predictions are provided in a single column under each construction activity.

As shown on Table 5-6, the majority of the predicted noise levels would exceed the FTA Construction Noise Impact Criteria. The construction activity producing the highest predicted noise levels at the receptors is sheet piling, which would only be required under Alternative 4. Construction of Alternatives 2 or 3 would not require the use of sheet piling. All ten receptors are predicted to exceed the criteria if sheet piling is conducted nearby under an Alternative 4 scenario. Predicted noise levels would exceed the criteria at three of the residential receptors (R-2, R-3, and R-4) representing Capitol Quarter and Capper Senior Apartments. The two residential receptors (R-9 and R-10) located on the east end of the LOD south of Virginia Avenue Park are predicted to largely avoid noise impacts primarily because they are set back further from the LOD in comparison to the Capitol Quarter and Capper Senior Apartments receptors.

In general, noise construction of the Project would be a nuisance to any nearby land uses, but is usually limited to daylight hours when most human activity occurs. In addition, construction noise is also intermittent and depends on the type of operation, location, and function of the equipment as well as the equipment usage cycle.

Noise from Construction-Period Freight Train Operations

During construction, trains would be operating within an open trench (Alternatives 2 and 4) or within a tunnel (Alternative 3). The noise effects of trains operating under such conditions were evaluated using the FTA's Transit Noise and Vibration Impact Assessment manual developed for the Chicago Rail Efficiency and Transportation Efficiency projects. This is typically known as the CREATE procedures. In addition, a number of operating assumptions (e.g., speed, etc.) were made, which are detailed in the noise technical report in Appendix E. To be

Figure 5-1
Construction-Period Noise Modeling Receptor Sites



Table 5-6
Predicted Construction Noise Levels for the Build Alternatives by Receptor Location and Type of Construction Activity

Receptor ¹	Slurry Wall		Excavation		Excavation/ Demolition		Structural Concrete		Paving		Work/Backfill/ Drainage		Sheet Pile	
	Alt 2/3	Alt 4	Alt 2/3	Alt 4	Alt 2/3	Alt 4	Alt 2/3	Alt 4	Alt 2/3	Alt 4	Alt 2/3	Alt 4	Alt 2/3	Alt 4
R-1 ²	85	83	83	81	87	85	86	84	89	86	86	84	N/A	93
R-2	85	83	83	81	87	85	86	84	89	86	86	84	N/A	93
R-3	78	77	76	75	80	79	79	78	82	81	80	79	N/A	87
R-4	85	83	83	80	86	84	86	84	88	86	86	84	N/A	93
R-5	85	83	83	80	86	84	86	84	88	86	86	84	N/A	93
R-6	78	77	76	74	80	78	79	78	81	80	79	78	N/A	87
R-7	83	81	81	79	85	83	84	82	86	84	84	82	N/A	91
R-8	82	80	80	78	84	81	83	81	86	83	84	81	N/A	90
R-9	76	74	74	72	78	76	77	75	80	78	78	76	N/A	84
R-10	77	74	74	72	78	76	78	75	80	77	78	75	N/A	84

Notes: ¹ See Figure 5-1 for locations, which are:

- R-1: 200 I Street SE (commercial land use)
- R-2: Capitol Quarter (300 block)
- R-3: Capitol Quarter (400 block)
- R-4: Capper Senior Apartments
- R-5 North side of Marine turf field
- R-6: Marine quarters
- R-7: Commercial building on 8th Street SE
- R-8: Admiral at Barracks Row (future land use)
- R-9: Residences on Potomac Avenue SE (900 block)
- R-10: Residences on L Street SE (1000 block)

Measurements are in Leq dBA

N/A: Alternatives 2 and 3 do not require sheet piling

conservative with the analysis, the number of trains passing through the construction area was assumed to be 25 percent higher than existing conditions.

The same ten receptors used to evaluate construction equipment noise were used to evaluate train operations noise during construction (see Figure 5-1). The predicted noise levels at these receptors for Alternatives 2 and 4 are presented in Tables 5-7 and 5-8, respectively. Alternative 3's temporary train operation would be conducted almost entirely underground (no trains operating in a protected trench near residences). Therefore, its noise effects would be similar to those under existing conditions. All of the receptors are Category 2 land uses, with the exception of R-1, R-5 and R-7.

As shown on Tables 5-7 and 5-8, none of the receptors under Alternatives 2 and 4, respectively, are predicted to experience Project-related sound levels that would exceed the CREATE criteria, which are based on a certain increase in cumulative noise exposure from freight train operations when compared to existing sound levels. The total noise shown on Tables 5-7 and 5-8 (second to the last column) represents the cumulative or total ambient noise with the construction-period train operations. It is calculated by logarithmically adding the "build" noise levels to the "existing" noise levels, which as noted in Section 4.6 is largely affected by traffic noise from I-695. In both tables, the differences between total and existing levels would range from 0 to 2 dBA. A 2 dBA difference is not perceptible by humans. This means that by adding the noise from the temporary train operations to the existing ambient noise conditions, which are dominated by I-695 traffic noise, would result in no perceivable differences. Apart from the project-related noise effects discussed under construction, ambient noise levels among the receptors would continue to be primarily caused by normal traffic on I-695, not from the operation of freight trains.

Noise from Maintenance of Traffic

As noted in Section 3.3.1.4, a MOT plan would be implemented to maintain mobility in community while Virginia Avenue SE is closed during construction. A highway noise analysis was conducted to determine if traffic detours as specified in the MOT plan would cause noise impacts to noise sensitive receptors near the LOD and the traffic detours.

Modeled existing and construction-period noise levels were developing using FHWA's Traffic Noise Model (TNM), Version 2.5. The TNM predicts noise levels at selected locations based on traffic data, roadway design, topographic features, and the relationship of the analysis site to nearby roadways. Traffic information used to predict intersection conditions under the MOT plan was also used for the noise modeling.

Table 5-9 presents the results of the MOT noise analysis. A new set of receptors was modeled and their locations are shown on Figure 5-2. As shown on Table 5-9, the "increase over existing" (I.O.E) noise levels under Alternative 1 would be between 0 to 1 dBA (most were 0), which are likely the result of normal traffic growth. As noted above, a 1 dBA difference is imperceptible to humans. The modeled noise levels from traffic detours under the Build Alternatives would be almost identical to Alternative 1. Four sites are predicted to be 1 dBA

Table 5-7
Predicted Noise Levels from Temporary Train Operations under Alternative 2

Receptor		Dist. to Tracks Centerline (ft)	Existing Noise (Ldn dBA)	Train Noise Operating in Trench (Ldn dBA)	Cumulative Noise Exposure (Ldn dBA)	Increase Over Existing
ID*	Description					
R-1	200 I Street	43	70	59	70	0
R-2	Capital Quarter (300 Block)	43	70	66	72	2
R-3	Capital Quarter (400 Block)	95	70	61	71	1
R-4	Capper Senior Apartments	45	73	66	74	1
R-5	North Side Marine Turf Field	45	69	58	69	0
R-6	Marine Quarters	100	69	60	70	1
R-7	Commercial Building on 8 th St	55	69	65	71	2
R-8	Admiral at Barracks Row	60	69	64	70	1
R-9	Potomac Avenue SE (900 Block)	120	68	59	69	1
R-10	L Street SE (1000 Block)	115	68	59	69	1

Note: * See Figure 5-1

Table 5-8
Predicted Noise Levels from Temporary Train Operations under Alternative 4

Receptor		Dist. to Tracks Centerline (ft)	Existing Noise (Ldn dBA)	Train Noise Operating in Trench (Ldn dBA)	Cumulative Noise Exposure (Ldn dBA)	Increase Over Existing
ID*	Description					
R-1	200 I Street	55	70	57	70	0
R-2	Capital Quarter (300 Block)	55	70	65	71	1
R-3	Capital Quarter (400 Block)	105	70	60	70	0
R-4	Capper Senior Apartments	57	73	65	74	1
R-5	North Side Marine Turf Field	57	69	57	69	0
R-6	Marine Quarters	115	69	59	69	0
R-7	Commercial Building on 8 th St	70	69	63	70	1
R-8	Admiral at Barracks Row	80	69	62	70	1
R-9	Potomac Avenue SE (900 Block)	150	68	57	68	0
R-10	L Street SE (1000 Block)	160	68	57	68	0

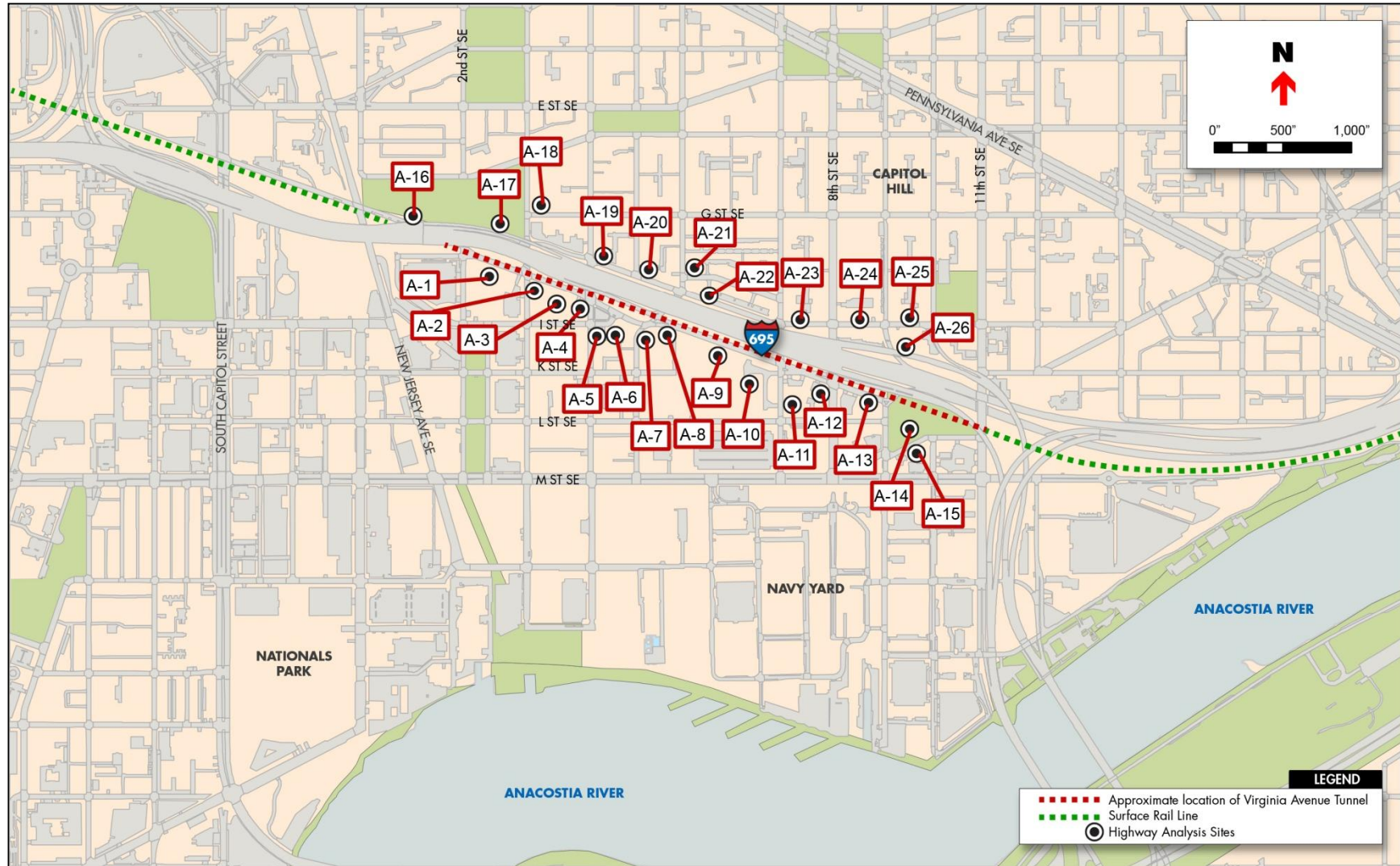
Note: * See Figure 5-1

Table 5-9
Predicted Noise Levels from Traffic Detours during Construction

Site*	Existing Conditions (Leq dBA)	Alternative 1		Build Alternatives	
		Noise Levels (Leq dBA)	Increase Over Existing	Noise Levels (Leq dBA)	Increase Over Existing
A-1	71	71	0	71	0
A-2	72	72	0	72	0
A-3	71	72	1	72	1
A-4	72	72	0	72	0
A-5	70	70	0	70	0
A-6	70	71	1	70	0
A-7	71	71	0	71	0
A-8	72	72	0	71	-1
A-9	70	70	0	70	0
A-10	69	69	0	69	0
A-11	70	70	0	70	0
A-12	72	72	0	72	0
A-13	70	70	0	69	-1
A-14	68	68	0	68	0
A-15	67	67	0	67	0
A-16	68	68	0	68	0
A-17	69	69	0	69	0
A-18	71	71	0	71	0
A-19	76	77	1	76	0
A-20	74	74	0	74	0
A-21	70	70	0	70	0
A-22	71	71	0	71	0
A-23	72	72	0	72	0
A-24	71	71	0	70	-1
A-25	69	69	0	68	-1
A-26	71	71	0	71	0

Notes: ¹ See Figure 5-2 for locations

Figure 5-2
Highway Noise Analysis Sites



less than their existing noise levels. For all intents and purposes, these noise levels are basically the same as the existing noise levels. Therefore, the traffic detours are not expected to increase noise levels in the general vicinity of the LOD during construction.

5.6.3 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in potentially similar impacts described under the Construction Impacts for the Build Alternatives. None of the Build Alternatives would result in post-construction impacts related to noise from freight operations at the receptors identified in Figure 5-1 because trains would operate in the rebuilt tunnel. The Build Alternatives were modeled and none of them are predicted to exceed the FTA thresholds for moderate noise impacts at any of the ten receptors.

Future noise conditions in and around Virginia Avenue SE would continue to be mostly influenced by auto traffic, especially from I-695, regardless of the Alternative.

5.6.4 Mitigation Measures

For each of three Build Alternatives, the majority of predicted construction noise levels associated with activities that are essential to the reconstruction of Virginia Avenue Tunnel would exceed the FTA Construction Noise Impact Criteria (see Table 5-6). Sheet piling, which is a required activity only for Alternative 4, would not be conducted until after 8:30 AM and would be discontinued by 4:30 PM. Also, the contractor would use vibratory techniques to install the sheet piles, instead of driven techniques, if working near residences.

The following mitigation measures, which are deemed at this time to be reasonable (i.e., cost effective) and feasible (i.e., physically achievable), could reduce the amount of noise generated during construction. Additional details to these measures would be developed during final design when more information about construction is developed. These mitigation measures would be employed regardless of the Build Alternative selected.

- Adhere to DDOT construction noise specifications.
- Establish a community outreach program to notify nearby residents and businesses about upcoming high noise producing activities, such as pile installation.
- Establish procedures address noise complaints during construction.
- Prepare a noise monitoring plan and conduct noise monitoring during construction in accordance with the plan.
- Use a type of LOD fencing (e.g., wood stockade or type of solid material) near noise sensitive receptors that could also serve as temporary noise barriers.
- Hang noise dampening blankets on the inside face of the solid fencing if the effectiveness of the noise barriers need to be improved.
- Where feasible, use drilled installation methods instead of driven methods when installing bearing and temporary support piles near residences.

-
- Properly maintain all motorized equipment in a state of good repair to limit wear induced noise (e.g., mufflers are in good working condition).
 - Consider noise impacts in selecting construction equipment that need to run over extended periods of time, such as gen sets (whisper quiet line).
 - Where feasible, use demolition equipment with crush/shear technology, instead of impact technology.
 - Place stationary noise generating equipment as far from residences as reasonably practical and feasible.
 - Limit high noise generating activities to daytime and weekdays as reasonably practical and feasible.
 - Where feasible, combine operations or activities with high noise levels to occur in the same time period.
 - Route heavily loaded delivery and disposal trucks away from residential streets as reasonably practical and feasible (e.g., using the west staging area and east end of the LOD where there are fewer residences).

As a result of this Project's NEPA process, CSX has concluded that its practice to require every train to blow its horn before entering and exiting the tunnel is no longer mandatory due to other safety and security measures in and around the tunnel. Like all railroad companies and consistent with federal regulations, CSX still expects its locomotive engineers to use the train horn for safety reasons both during and after construction. However, an immediate benefit of the Project's NEPA process is the elimination of the mandatory horn-blowing practice, and the resultant overall reduction of horn noise in the surrounding neighborhood.

5.7 Vibration

This section summarizes the results of vibration impact analyses conducted for the Project. A vibration technical report is provided in Appendix F. FTA procedures were used for predicting the vibration impacts of this Project. This section includes quantitative construction-period assessments because buildings are located near the LOD, and therefore, there is the potential that construction-period vibration could cause building damage. The predictions for construction related vibration are preliminary because detailed construction activity information would not be available until final design. Construction vibration levels would be recalculated at that time, which may affect proposed mitigation measures. A description of the characteristics of vibration is provided in Section 4.7 and in the vibration technical report in Appendix F.

5.7.1 Vibration Impact Criteria

Vibration impacts are evaluated in terms of: (1) human annoyance and (2) building damage. Human annoyance occurs when vibration rises above the threshold of human perception for extended periods of time. Building damage could vary since not all structures are equal in terms of their susceptibility to damage from ground-borne vibration. Typically, older buildings are more susceptible to vibration damage than newer buildings because their construction may

have been in accordance with building codes (or lack thereof) that may not have considered seismic standards or standards typical of today's practices or may have sustained wear-and-tear over the years.

Table 5-10 presents the human annoyance impact criteria by land use category. The impact would vary by the frequency of vibration-causing event. The impact criteria for acceptable ground-borne vibration are expressed in terms of VdB or peak particle velocity (PPV).

Table 5-10
Human Annoyance Vibration Impact Criteria by Land Use Category

Land Use Category	Ground-Borne Vibration Impact Criteria (VdB and PPV)					
	Frequent ¹		Occasional ²		Infrequent ³	
Category 1: Buildings where vibration would interfere with interior operations	65 VdB ⁴	0.007 in/sec	65 VdB ⁴	0.007 in/sec	65 VdB ⁴	0.007 in/sec
Category 2: Residences and buildings where people normally sleep	72 VdB	0.016 in/sec	75 VdB	0.023 in/sec	80 VdB	0.040 in/sec
Category 3: Institutional land uses with primarily daytime use	75 VdB	0.023 in/sec	78 VdB	0.032 in/sec	83 VdB	0.056 in/sec

Notes: ¹ More than 70 vibration events per day

² Between 30 and 70 vibration events of the same source per day

³ Fewer than 30 vibration events per day

⁴ Criteria based on levels that are acceptable for the most moderately sensitive equipment, such as optical microscopes

Source: FTA, Transit Noise and Vibration Impact Assessment, 2006.

Certain types of buildings, such as TV and recording studios, are sensitive to vibration, but do not fit into any of the three categories identified in Table 5-11. Because of their vibrations sensitivity, special impact criteria are used as shown on Table 5-11.

Table 5-11
Human Annoyance Vibration Impact Criteria for Special Buildings

Type of Building or Room	Ground-Borne Vibration Impact Criteria (VdB and PPV)			
	Frequent ¹		Occasional or Infrequent ²	
Concert or Band Halls, TV Studios, Recording Studios	65 VdB	0.007 in/sec	65 VdB	0.007 in/sec
Auditoriums, Theaters	72 VdB	0.016 in/sec	80 VdB	0.040 in/sec

Notes: ¹ More than 70 vibration events per day

² Fewer than 70 vibration events of the same source per day

Source: FTA, Transit Noise and Vibration Impact Assessment, 2006.

Certain construction activities could result in varying degrees of ground vibration, depending on the equipment and method employed. The types of construction activities that could cause ground-borne vibration include demolition, excavation, and shoring of tunnels. Since these activities have the potential to damage nearby buildings through ground-borne vibration, FTA vibration impact criteria for buildings as shown on Table 5-12 was used in the analysis.

Table 5-12
Building Vibration Damage Impact Criteria

Building Category	PPV (in/sec)
I. Reinforced-concrete, steel, or timber (no plaster)	0.5
II. Engineered concrete and masonry (no plaster)	0.3
III. Non-engineered timber and masonry buildings, such as Capitol Quarter and the Marine bachelor quarters	0.2
IV. Buildings extremely susceptible to vibration damage, such as the St. Paul AUMP Church	0.12

Source: FTA, Transit Noise and Vibration Impact Assessment, 2006.

Normally, vibration resulting from a train pass by would not cause building damage. However, the potential for damage to fragile older buildings located very near to or within the right-of-way could be a concern.

5.7.2 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 would not result in construction vibration impacts. The discussion provided in the Construction Impact section for Vibration focuses exclusively on the three Build Alternatives.

Vibration impact analysis was conducted to determine the potential that construction activities could cause human annoyance or damage to buildings located near the LOD. The analysis evaluated the major vibration producing construction equipment expected to be used during construction.

Vibration levels produced by construction equipment were obtained from the FTA publication, Transit Noise and Vibration Impact Assessment (2006) for types of construction equipment that are anticipated to be used. Based on the typical vibration levels provided in this publication, calculations were conducted to determine the distances at which vibration impacts would occur from vibration sources. Table 5-13 shows the vibration levels at a reference of 25 feet and results of these calculations in terms of human annoyance and building damage. The distances shown in this table are the maximum distances at which short-term construction vibration impacts may occur. If buildings are located within those distances shown under "Building Damage", mitigation measures would need to be considered to prevent building damage.

Table 5-13
Construction Equipment Vibration Impact Distances

Equipment	PPV at 25 ft (in/sec)	Distance to Vibration (feet)	
		Human Annoyance ¹	Building Damage ²
Large bulldozer	0.089	38	21
Dump trucks	0.076	35	20
Hoe Ram	0.089	38	21
Caisson drilling	0.089	38	21
Vibratory compactor/roller	0.210	59	33
Sheet Driver (Sonic)	0.170	53	30
Jackhammer	0.035	13	23

Notes: ¹ This is the distance at which the PPV is 0.04 in/sec or less² This is the distance at which the PPV is 0.20 in/sec or less

Based on available project information, the operation of construction equipment is not predicted to cause vibration-related damage to buildings located near the LOD because no building is located within the distances identified in Table 5-13. Detailed calculations would be conducted during final design to when detailed plans for the construction activities are developed.

Table 5-14 shows predicted PPV values at Capitol Quarter (nearest townhouses facing Virginia Avenue SE), Capper Senior Apartments (nearest north facing apartments), St. Paul AUMP Church and the Marine Band Practice Hall located within the recreation facility. Based on these results, it is anticipated that certain major vibration producing construction activities would cause annoyance to those Capitol Quarter townhouses nearest to the LOD. The north facing units of Capper Senior Apartments are also predicted to experience annoyance. The exact nature and duration of such possible annoyances would be determined during final design when detailed plans for the construction activities are developed.

During construction, trains would be operating within a secured open trench (Alternatives 2 and 4) or within a tunnel (Alternative 3). The vibration effects of trains operating under such conditions are described under Post-Construction Impacts below, even though such operations would occur during construction.

Table 5-14
Highest Construction Equipment Vibration Levels

Equipment	PPV (in/sec)		
	Capitol Quarter and Capper Senior Apartments	St. Paul AUMP Church	Marine Band Practice Hall
Large bulldozer	0.036	0.004	0.010
Dump trucks	0.031	0.003	0.008
Hoe Ram	0.036	0.004	0.010
Caisson drilling	0.024	0.003	0.008
Vibratory compactor/roller	0.086	0.008	0.023
Sheet Driver (Sonic)	0.045	0.006	0.015
Jackhammer	0.014	0.001	0.004

Note: The PPV values assume use of single equipment. If more than one equipment is operating at the same time, PPV values would be higher.

5.7.3 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in potentially similar impacts described under the Construction Impacts for the Build Alternatives. Nevertheless, under Alternative 1 vibration conditions as described in Section 4.7 would continue.

For the Build Alternatives, vibration levels associated with train pass bys were calculated using four parameters:

- Distance between the receptor and proposed edge of track;
- Actual recorded vibration measurements taken during train pass-bys;
- Soil factors calculated from the train pass by measurements; and
- Adjustment factors to account for the train passing through the tunnel.

Among the construction scenarios, Alternative 2, which would have freight trains operating in a protected trench on the south side of the existing tunnel, was determined to have the highest potential among three Build Alternatives to cause vibration impacts along nearby buildings. For the Build Alternatives, the source of vibrations from trains was doubled to take in account that two trains would be able to use the new rebuilt tunnel simultaneously. Under Alternative 1 and Alternative 2 during construction, just one train would be able to pass through the tunnel at one time.

Taking into account the four parameters, the distances in which vibration impacts would occur under a post-construction rebuilt Virginia Avenue Tunnel were calculated and shown on Table

5-15. The table includes both potential building damage and human annoyance impact distances. It also includes the vibration impact distances for Alternative 2 during construction. Under any of the Build Alternatives, a receptor located greater than 20 feet away from the edge of track would not experience a vibration impact that would cause building damage. For human annoyance impacts, the distance would be greater than 36 feet away from the edge of track. Again, these distances are based on two trains traveling in opposite directions within the rebuilt tunnel at the same time.

Table 5-15
Impact Distances for Ground-Born Vibration Train Pass Bys

Alternative	Distance to Vibration Building Damage (feet)		Distance to Vibration Annoyance (feet)	
	Train at Grade	Train in Tunnel	Train at Grade	Train in Tunnel
Alternative 1	13	10	24	17
Alternative 2 (Construction)	13	10	24	17
Alternative 2	23	20	41	36
Alternative 3	23	20	41	36
Alternative 4	23	20	41	36

Among the three Build Alternatives, the south side track of Alternative 3 would be located furthest south or closest to the buildings located along Virginia Avenue SE. Using the distance information in Table 5-15 and knowing the distance between the closest buildings along Virginia Avenue to Alternative 3's edge of track is 44 feet distance, vibration impacts to buildings or to human annoyance due to train operations are not predicted under any of the Build Alternatives.

5.7.4 Mitigation Measures

A vibration monitoring and mitigation plan would be prepared by a qualified vibration engineer, which would include vibration monitoring procedures at predetermined vibration sensitive sites, revised calculation of vibration levels for various construction phases, and revised mitigation measures based on the re-calculations. No construction work or the operation of vibration generating equipment at the construction site would start until DDOT has approved the plan. The plan would be updated if there are any major changes to the planned construction activities.

Tables 5-13, 5-14, and 5-15 list activities of concern that could affect people and buildings from ground-borne vibration, and they provide accepted standards for predicting the spatial relationship between vibration activities and potential human annoyance or building damage.

The vibration monitoring and mitigation plan would update this information. For this project, it is possible that certain construction activities could cause intermittent localized concern due to vibration generated from construction activities within the LOD. Therefore, those tables would provide the criteria for employing procedures to minimize the potential for human annoyance or building damage from vibration. For example, the owner of a building close enough to a construction vibration source that damage to that structure due to vibration is possible would be entitled to a pre-construction building inspection to document the pre-construction condition of that structure. Similarly, individuals who live within the predicted range of human annoyance from construction activities, such as the operation of vibratory rollers, would know that this essential construction activity, absent urgent and unexpected circumstances, would only be conducted during weekday daytime hours when many residents are away from their homes.

In addition, to offering pre-construction inspections to nearby building owners, the following other mitigation measures that could reduce the amount of vibration generated during construction would be employed:

- Conduct vibration monitoring to check the accuracy of the information contained on Tables 5-13, 5-14, and 5-15 (or update information);
- Properly maintain all motorized equipment in a state of good repair to limit wear induced vibration;
- Where feasible, avoid the use of pile driving near residences, and instead use drilled piles or the use of a sonic or vibratory pile driver, which cause lower vibration levels, where the geological conditions permit their use;
- Limit the use of high vibration generating activities to weekday daytime hours when many residents are away from their homes as reasonably practical;
- Develop a phasing plan so that high vibration generating activities do not occur within the same time period, to the extent practicable;
- Avoid routing heavily-loaded trucks through densely concentrated residences, if reasonably possible;
- Where feasible, use demolition methods that do not involve impact; and
- Avoid the use of vibratory rollers and packers near sensitive areas, if possible.

5.8 Site Contamination - Soils

Several sources were used to evaluate the potential for soil or groundwater contamination within the LOD as a result of current and/or historical activities on nearby and adjacent properties. The results of this assessment are detailed in the Modified Phase I Environmental Site Assessment (Phase I ESA), which is provided in Appendix G, and summarized in Section 5.8. This section discusses potential construction and post-construction impacts related to soil and groundwater contamination, taking into consideration the facilities of concern identified within and surrounding the LOD.

5.8.1 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 would not result in construction impacts related to soil and groundwater contamination. The discussion provided in the Construction Impact section for Geology and Site Contamination focuses exclusively on the three Build Alternatives.

Construction activities associated with the Build Alternatives involve excavating the soil on top of, surrounding and beneath the existing tunnel, as well as other soils along the south side of the existing tunnel. Dewatering may be required along excavated areas. These construction activities may encounter legacy contaminated soil and groundwater that would require proper handling and disposal. However, based on the sampling conducted for the Project (see Section 4.8.2), management of contaminated media (soil and groundwater) during construction is not expected to be a major issue of concern for any of the Build Alternatives.

The sampling identified a few possible locations of contaminated media. Depending on the nature and extent of pre-existing contamination that may be present from past activities, proper precautions would need to be taken to protect workers and the public against potential hazards. The handling of contaminated groundwater would require proper management and pretreatment prior to discharge to the sewers under a National Pollutant Discharge Elimination System (NPDES) permit. Construction in any contaminated areas would be subject to regulatory requirements of DDOE.

If pre-existing and unexpected contaminated media is uncovered based on visual and/or olfactory evidence during construction activities, the soil or groundwater would need to be tested to evaluate whether it is contaminated. If it is found to be contaminated, it would need to be properly classified and disposed. Contaminated groundwater would require proper management and pretreatment prior to discharge to the sewers under a NPDES permit.

Under Alternatives 2 and 3, it would be necessary to import additional clean soil for use as fill as part of the Project. This soil would be obtained from commercial gravel pits and would be clean, non-impacted soil. Under Alternative 4, it would be necessary to export soil from the project. This soil would be stockpiled and tested in accordance with applicable laws and regulations to ensure it is not contaminated before it is cleared for use at an off-site location. In the event the soil is found to be contaminated, it would be appropriately handled and disposed.

Dewatering activities near potential contaminated zones may result in the collection and discharge of contaminated groundwater from pre-existing sources. Where this occurs, treatment of the dewatering effluent may be necessary before discharging to the sanitary sewer. The treatment of the effluent would likely be done using a carbon filtration system. The dewatering treatment would be performed under a DDOE permit for the discharge of treated groundwater.

The Build Alternatives would include stormwater management measures which would improve groundwater resources within and surrounding the LOD. These stormwater design elements would improve water quality by intercepting pollutants from construction areas and preventing their delivery to surface waters, such as the Anacostia River. Runoff from construction occurring south of the tunnel would be collected and treated in sediment traps or by super silt fencing and proposed or existing inlets. Runoff from construction occurring north and south of the tunnel may also drain into the tunnel to be treated there prior to being discharged into any of three combined sewer systems within the project limits. Since the runoff and underground seepage water discharges into the combined sewer system, permission from DDOT/DC Water would be required.

5.8.2 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in potentially similar impacts described under the Construction Impacts for the Build Alternatives. Nevertheless, no long-term impacts related to soil and groundwater contamination are anticipated to occur as a result of Alternative 1.

Occasionally, the rebuilt tunnel would likely require dewatering of the tunnel corridor, and the installation of sumps to maintain a dry condition. Any contaminated water encountered during long term dewatering would have to be disposed of in accordance with applicable laws and regulations.

5.8.3 Mitigation Measures

During final design, a soil and groundwater management plan will be prepared based on the sampling information collected for the Project. In addition to noting the locations of existing contaminated media (from the sampling information), the plan would include protocols for the unexpected discovery of contaminated media during construction. The construction contractor would conduct excavation and dewatering activities based on the plan. The contractor would be required to take all appropriate regulatory precautions to properly handle and dispose contaminated soil or groundwater encountered (expected and unexpected) during construction. A health and safety plan would be prepared and implemented where contamination is identified and handled.

5.9 Water Resources

5.9.1 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 would not result in impacts to water resources. The discussion provided in the Construction Impact section for Water Resources focuses exclusively on the three Build Alternatives.

5.9.1.1 Surface Water

The three Build Alternatives would have similar impacts to surface water resources. According to published data and a site visit, no water bodies or watercourses were identified within the LOD. However, small non-jurisdictional ditches located along the toe-of-slope of the rail ballast were seen sporadically within the LOD. These small ditches may contain water, but do not maintain hydrologic connectivity to the Anacostia River or any other jurisdictional waterway.

Regardless of the Build Alternative, all stormwater within the LOD would be treated to filter out debris and other pollutants before discharge from the LOD. Currently, stormwater runoff from Virginia Avenue SE and adjacent roadways is directed into combined sewer systems (stormwater included). Proposed site clearing, excavation and grading activities within the LOD, including the designated construction staging and stockpile area in Jersey Rail Yard, would be covered by stormwater treatment and control measures in coordination with the DDOE and DC Water.

Navigable Waters

The Build Alternatives do not require in-stream work. Therefore, no obstruction of the navigability of adjacent waterways would occur.

Chesapeake Bay Protection

Because of its present condition, the nearby Anacostia River has been designated one of three high-priority regions of concern within the Chesapeake Bay Region by the Chesapeake Bay Program. Total Maximum Daily Loads (TMDLs) have been established for the Potomac River, which is the District's major river basin within the Chesapeake Bay. The Chesapeake Bay is far removed from the LOD so it is unlikely that adverse impacts would occur to aquatic life, wildlife habitat, and water quality as a result of this Project. Nevertheless, the Project would include best management practices during construction to ensure that construction activities do not affect TMDL management and would not lead to pollutant runoff.

5.9.1.2 Groundwater

Groundwater is hydrologically connected to the Anacostia River in the vicinity of the LOD. The Anacostia River represents one of two major surface-water bodies in the District, and interactions between the river and groundwater are both induced and natural. Excavation of trenches for tunnel construction requires dewatering which would result in temporary impacts to groundwater. The quantities of water expected to be extracted due to trenching under all of the Build Alternatives would be of relatively small quantities, and would affect only the local groundwater table. Information collected from the soil borings and water wells conducted for this Project (see Section 4.8) indicate that the dewatering needed for any of the Build Alternatives would not cause damage to any nearby structure, such as I-695. Upon completion of dewatering, groundwater levels in the general vicinity of the LOD should return to pre-construction conditions.

5.9.1.3 Wetlands

As noted in Section 4.9, no jurisdictional or regulated wetlands were identified within the LOD. In accordance with survey methods presented in the 1987 Wetlands Delineation Manual prepared by the U.S. Army Corps of Engineers (USACE), no wetlands were identified within the LOD. For regulatory purposes, a wetland is (40 CFR 230.3(t)): "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas."

The Project, regardless of the Build Alternative, would not require a permit from the USACE in accordance with Section 404 of the Clean Water Act due to the lack of wetlands in the LOD. The Build Alternatives would, however, fill two small unregulated wet areas located within the construction staging and stockpile area in Jersey Rail Yard and along the toe-of-slope of the rail ballast near the east portal. These wet areas do not meet the definition of a wetland according to the 1987 manual, and would not be subject to the Section 404 regulations.

5.9.1.4 Floodplains

In accordance with Executive Order 11988, Floodplain Management, and corresponding NPS Floodplain Management Director's Order (DO) 77-2, Floodplain Management, floodplain encroachments should be avoided or minimized to the maximum extent practicable. Federal agencies are required to reduce the risk of flood loss, minimize flood impacts to human safety, health, and welfare and to restore and preserve beneficial floodplain values and functions.

Reconstruction of the Virginia Avenue Tunnel would not occur within a floodplain, but, a small portion of the construction staging and stockpile area within the Jersey Rail Yard lies within the 500-year floodplain of the Potomac River. A very small portion is also within the 100-year floodplain. This area is disturbed and functions primarily as flood storage. Impacts to the 100-year floodplain in this area would be approximately 0.05 acres while impacts to the 500-year floodplain would be approximately 1.20 acres, which would occur from staging and stockpiling of materials, grading, and tree clearing activities. Disturbance within this floodplain may result in flood displacement during construction. However, this effect to floodplain functions would be temporary. Re-grading of the Jersey Rail Yard would return the floodplain to preconstruction conditions, allowing it to return to its normal flood storage capacity.

5.9.2 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in potentially similar impacts described under the Construction Impacts for the Build Alternatives. Nevertheless, no long-term impacts to water resources are anticipated to occur as a result of Alternative 1.

5.9.2.1 Surface Water

Each of the Build Alternatives could result in a reduction of impervious surface due to the restoration of Virginia Avenue SE, which would result in a decrease in runoff volumes and downstream peak discharge rates into the nearby Anacostia River. The rebuilt tunnel would contain its own stormwater management system. The street restoration would, as part of the Build Alternatives, include elements of Low Impact Development (LID), such as providing small landscape features to absorb and manage a portion of the stormwater runoff from Virginia Avenue SE. Continuous tree root zones may allow for healthier tree growth, subsurface drainage, and absorption of stormwater. Furthermore, small landscape treatments would filter stormwater and allow it to be absorbed into underlying soils. As the design of the Project advances, LID elements would be considered where feasible for the restoration of Virginia Avenue SE.

Due to the reduction of impervious surfaces and the use of LID elements, contaminated stormwater runoff to surface waters associated with impervious surfaces is anticipated to stay the same or decrease slightly. Due to the urban conditions in the general vicinity of Virginia Avenue SE and the stormwater infrastructure within the tunnel, the Build Alternatives would have no impact on TMDL management established by the District.

Navigable Waters

Upon completion of construction, freight operations of the rebuilt tunnel would continue with greater efficiencies due to the additional track. Current operations of the tunnel do not impact navigable waters, nor would future operations be anticipated to occur as a result of the No-Build Alternative or any of the Build under the Build Alternatives.

Chesapeake Bay Protection

Because of implemented stormwater management measures, the Build Alternatives would not lead to any increases in nutrient, contaminant, and sediment releases from Virginia Avenue SE, and the TMDL established for the Anacostia and Potomac Rivers would be unaffected.

5.9.2.2 Groundwater

Upon completion of the Project, no post-construction impacts to groundwater resources in the general vicinity of the rebuilt tunnel are anticipated. Additionally, groundwater recharge may improve somewhat because the Project could reduce the overall amount of impervious surfaces on Virginia Avenue SE, depending on how this street is restored.

5.9.2.3 Wetlands

No new wetlands would be created as a result of the Project. As noted in Section 4.9.3, the LOD does not contain regulated wetlands.

5.9.2.4 Floodplains

The Build Alternatives would not result in any new infrastructure located within in the regulatory floodway. In addition, as noted in Section 5.1, the Project would have no affect on land use development. Therefore, it would not cause or influence urban development within the regulatory floodway.

5.9.3 Mitigation Measures

Surface Water

Temporary erosion control measures and stormwater management systems in accordance with DDOT construction specifications, the National Pollutant Discharge Elimination System (NPDES) permit program and DDOE requirements would be used as mitigation measures to reduce or eliminate contamination of surface water runoff resulting from exposure to construction sites. Adherence to DDOT and federal design criteria for the construction of roadways and bridges would eliminate the potential for long-term soil erosion from construction. In addition, appropriate spill prevention and control plans would be prepared in accordance with DDOT and DDOE requirements and regulations.

Floodplains

The construction staging and stockpile area in the Jersey Rail Yard would be designed in accordance with current drainage practices and standards to minimize the chances of increasing flood elevations. Coordination with local agencies and the Federal Emergency Management Agency, as required, would occur to ensure that the Jersey Rail Yard is managed in accordance with local flood hazard development permit requirements, flood conveyance capacity plans, and floodplain management programs.

5.10 Vegetation and Wildlife

5.10.1 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 would not result in impacts to vegetation and wildlife. The discussion provided in the Construction Impact section for Vegetation and Wildlife focuses exclusively on the three Build Alternatives.

5.10.1.1 Flora

In general, existing vegetation within LOD would be removed under each of the three Build Alternatives. This includes all street trees within public right-of-way and trees outside of the right-of-way (CSX, Virginia Avenue Park, and U.S. Marine Corps property). Because Alternatives 2 and 3 have the same LOD, both would displace the same number of trees. Of the total trees surveyed, 168 street trees located within the public right-of-way would be removed along with 15 trees located within Virginia Avenue Park and eight trees within the Marine Corps property.

With a slightly smaller LOD, Alternative 4 would remove four fewer trees within the public right-of-way portion of the LOD in comparison to Alternatives 2 and 3: The impacts within Virginia Avenue Park and the Marine Corps property would be the same. Additionally, all trees located within CSX property (Jersey Rail Yard and east end of Project limits) would be removed by each of the three Build Alternatives. However, not all trees within CSX property were surveyed since only those meeting a certain size are regulated by DDOT Urban Forestry Administration (UFA).

The UFA regulates all street trees within public right-of-way, and requires compensation for the removal of all healthy trees greater than 2-inches diameter at breast height (DBH). Trees in new and excellent to fair condition are considered healthy trees. Of the 168 trees that located within public right-of-way that would be removed under Alternatives 2 and 3, the UFA would require a mitigation fee for 110 of them (55 trees are between 2" and 6" DBH; eight trees are between 6.1" and 12" DBH; and 47 trees have a DBH of 12.1" or more). Of the 164 trees within public right-of-way that would be removed under Alternative 4, the UFA would require a tree removal fee for 104 of them (50 trees are between 2" and 6" DBH; seven trees are between 6.1" and 12" DBH; and 47 trees have a DBH of 12.1" or more). Mitigation for street tree removals is discussed in Section 5.10.3.

The UFA regulates trees on private property differently than trees within the public right-of-way. Only healthy trees with a circumference of 55-inches/17.5-inches DBH or greater (special trees) on private property are regulated and require mitigation. Each of the three Build Alternatives would remove every tree located within CSX property. However, only 20 of the removed trees would qualify as healthy special trees requiring mitigation tree removal permit. The remaining trees on CSX property that would be removed by any of the Build Alternatives are not considered special trees, and do not require permitting. The affected trees within Virginia Avenue Park and the U.S. Marine Corps property are also not considered special trees. Mitigation for tree removals on private property is discussed in Section 5.10.3.

A tree removal permit would be obtained from UFA just prior to construction. To obtain this permit, fees would be paid to UFA, based upon the number of healthy street trees (new and excellent to fair condition) of greater than 2-inches DBH for street trees within public right-of-way, and of special trees located on private property. The precise fee is based on the size of the tree, and could be waived for the removal for certain species of trees to be determined by UFA on a case-by-case basis. Based on UFA's fee schedule, the total fee for Alternatives 2 or 3's removal of 110 street trees would be approximately \$133,100. The total fee for Alternative 4's removal of 104 street trees would be approximately \$130,300. The fee for removing the 20 special trees on CSX property would be approximately \$15,600, and would be applied regardless of the Build Alternatives.

5.10.1.2 Fauna

Regardless of the Build Alternative, the potential impacts to wildlife during construction would be the same or very similar. As noted in Section 4.10, the existing wildlife in the general vicinity of the LOD is adaptable to urbanized and disturbed habitats, and would unlikely be affected by

construction activities other than localized losses of habitat resulting from tree and vegetation removals described above. In an urban setting, trees provide limited terrestrial habitat. The largest wooded areas within the LOD are located within Jersey Rail Yard, but still within highly urbanized environment. Affected species would seek habitat elsewhere or retreat to adjacent vegetated areas outside of the LOD.

Bats were not observed within the LOD during field visits. However, if bats using the existing Virginia Avenue Tunnel or tree stands within the LOD for roosting, their habitat would be lost during construction. Affected bat species would seek habitat elsewhere or retreat to adjacent vegetated areas outside of the LOD.

The LOD is located within the Atlantic Flyway, an important pathway for migratory birds. However, suitable habitat for migratory bird species does not exist in the LOD, which lacks of mature forests, fields or wetlands favored by migratory birds. Consequently, migratory birds are not expected to use the Project Site for habitat, foraging, or nesting during construction.

Because the Project involves reconstructing an existing tunnel, the presence of rats and other rodents is possible during construction. Therefore, a rodent control program would be initiated prior to the start of construction and maintained during entire duration of construction. Activities before construction may include extermination and/or trapping. Controlling rodent populations during construction involves managing their food and water supply and their shelter. Food and construction waste would generally be separated, and trash containing food would be disposed of regularly. Fully enclosed and secure trash receptacles would be placed on-site for regular and frequent collection.

5.10.1.3 Threatened and Endangered Species

According to correspondence with the USFWS dated June 11, 2012 and a site visit, no federally listed or proposed endangered or threatened species or their habitats are known to exist within the LOD. Additional coordination with the NPS dated July 18, 2012, yielded no additional species.

The USFWS stated that bald eagles have increased their numbers within the Chesapeake Bay area. However, the LOD does not contain suitable habitat for the bald eagle, and the species was not observed during site visits. Additionally, Hay's spring amphipod is listed on the "Federally Listed Endangered and Threatened Species – District of Columbia" listing, but suitable habitat for this species does not exist within the LOD.

As such, construction of the Project, regardless of the Build Alternative, is not anticipated to affect threatened and endangered species.

5.10.2 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in potentially similar impacts described under the Construction Impacts

for the Build Alternatives. Nevertheless, no long-term impacts to vegetation and wildlife are anticipated to occur as a result of Alternative 1.

5.10.2.1 Flora

Regardless of the Build Alternative, Virginia Avenue SE and other affected areas, including Virginia Avenue Park and the Marine Corps Recreation Facility would be restored to pre-existing conditions, including the provision of landscaping. For Virginia Avenue SE, the Project sponsor would work with the UFA to develop and implement a landscape plan that would include the planting of new street trees and other vegetation in appropriate areas, such as the blocks fronting Capitol Quarter. The precise number and locations of the new street trees would be determined after coordinating with UFA. The landscaping plan for Virginia Avenue Park would be coordinated with NPS and the DPR. The landscaping plan for the Marine Corps Recreation Facility would be coordinated with the Marine Corps.

5.10.2.2 Fauna

Upon completion of the Project, the trees and vegetation planted as part of the restoration of Virginia Avenue SE and Virginia Avenue Park would return the affected areas as a place that provides limited habitat for wildlife species that have adapted to urbanized and disturbed habitats. The new trees would provide species displaced during construction to repopulate once the necessary vegetation is reestablished.

5.10.2.3 Threatened and Endangered Species

The return to normal freight operation within under any of the Build Alternatives would not result in any long-term impacts to threatened and endangered species, in part because none exist in the general vicinity of the rebuilt tunnel.

5.10.3 Mitigation Measures

In addition to the tree removal fees to be paid to UFA, affected street trees would be replaced on a one-to-one replacement ratio based on total DBH impacts. Prior to developing the tree replacement plan, an International Society of Arboriculture (ISA) certified tree inventory survey would be conducted to confirm the size and health of the street trees evaluated in the survey noted in Section 4.10. The ISA survey would dictate the mitigation requirements used to prepare the replacement plan. The street tree replacement plan would be coordinated with UFA during the landscaping plan development. Upon agreement with the UFA, the plan would be implemented towards the end of the construction when the affected streets are restored. The replacement plan for Virginia Avenue Park and the Marine Corps Recreation Facility would be coordinated with NPS/DPR and the Marine Corps, respectively.

5.11 Historic and Archaeological Resources

5.11.1 Section 106 Compliance

The FHWA formally initiated the Section 106 process on November 11, 2011. Section 4.11 introduced the NHPA Section 106 process and the concept of Area of Potential Effects (APE). With the establishment of the APE, potential historic properties are then identified within this area, with the conclusion being either “no historic properties affected” or “historic properties affected”

Because historic properties were identified within the Project’s APE (see Section 4.11), the following determinations are rendered by the lead federal agency (in this case, FHWA) for each historic property in the APE: “no effect”, “no adverse effect” or “adverse effect”.

In accordance with 36 CFR 800.6, a finding of adverse effect to historic properties requires that efforts to resolve such effects by developing and evaluating alternatives or modifications to the undertaking that could avoid, minimize, or mitigate adverse effects must be undertaken.

The glossary in the Table of Contents provides definitions of the Section 106 terminology used in this section as well as in Section 4.11.

5.11.2 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 would not result in impacts to historic properties. The discussion provided in the Construction Impact section for Historic and Archaeological Resource focuses exclusively on the three Build Alternatives.

Eighteen historic properties have been identified within the Project’s APE (see Section 4.11). Two of the 18 are also designated as National Historic Landmarks: the Washington Navy Yard and the United States Marine Corps Barracks and Commandant’s House. Although the Project is expected to result in an overall Section 106 “adverse effect” due to the construction effects of the Build Alternatives, the specifics of this determination are still under discussion between FHWA, DDOT, the DC SHPO and the consulting parties. However, the reason for the expected Section 106 “adverse effect” determination is due to the proposed demolition of the existing Virginia Avenue Tunnel, the temporary construction occupancy of Virginia Avenue SE and other streets noted in the L’Enfant Plan and within a contributing resource (Virginia Avenue Park) of the Capitol Hill Historic District, and construction proximity to St. Paul AUMP Church. Although the LOD under each of the three Build Alternatives would be in the vicinity the church, the existing tunnel is located over 100 feet away. The vibration effects of demolishing the existing tunnel and reconstructing the new tunnel would not be expected to migrate to the church site (see Section 5.7.2). Nevertheless, the church would be inspected prior to the start of construction and monitored during construction.

In addition, an archaeological site of cut stone block paving, which is a remnant of the original Virginia Avenue SE within the 11th Street Bridges right-of-way, would be affected by the

construction of any of the Build Alternatives. The Build Alternatives' formal effects assessment regarding the 18 properties within the APE will be completed and rendered by the FHWA as part of the Section 106 process.

5.11.3 Post-Construction Impacts

Under Alternative 1 (No Build), the tunnel would eventually need to be rebuilt or undergo major rehabilitation, which may adversely affect the historical integrity of the tunnel. An emergency or unplanned repair may likely require at least a partial demolition of the tunnel. It is also uncertain if a major repair or rehabilitation of the tunnel would adversely affect the L'Enfant Plan. However, a major emergency or unplanned repair to the tunnel would not be a federal action unless a Federal approval is required. Therefore, it would not likely trigger the requirements NHPA Section 106.

Once completed, the Project, regardless of the Build Alternative, would not potentially affect historic properties. In other words, the factors that would lead FHWA to potentially make an "adverse effect" determination would all occur during construction. The post-construction condition of the rebuilt Virginia Avenue Tunnel is not expected to cause an adverse effect to any of the historic properties in the APE. Upon completion of the Project, the rebuilt Virginia Avenue Tunnel would not be considered historic.

The restoration of Virginia Avenue SE may involve the straightening of the street between 4th and 5th/6th Streets SE. This re-alignment may be more in keeping with the original L'Enfant intention for Virginia Avenue SE. The current curvature of the street at this location was made at the time I-695 was originally constructed. A "straight" Virginia Avenue SE would be more in keeping with the original intent of the L'Enfant Plan than the current geometric configuration of the street. Therefore, this potential change, if desired by the stakeholders, would not likely result in an adverse effect to the L'Enfant Plan.

5.11.4 Mitigation Measures

Since a Section 106 "adverse effect" is expected, mitigation would be developed in consultation with the DC SHPO and consulting parties in the preparation of a Memorandum of Agreement (MOA). At a minimum, MOA would include the historic recordation of the Virginia Avenue Tunnel in accordance with appropriate standards.

5.12 Parks and Recreational Resources

5.12.1 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 would not result in impacts to parks and recreational resources. The discussion provided in the Construction Impact section for Parks and Recreational Resources focuses exclusively on the three Build Alternatives.

Virginia Avenue Park is considered a resource protected under Section 4(f) of the U.S. Department of Transportation Act of 1966 (see Chapter 5 for further information), as well as Section 6(f) of the Land and Water Conservation Fund Act (see Section 5.12.3 for further information).

The LODs of the Build Alternatives would all require a portion of Virginia Avenue Park to maintain temporary train operations, demolish the existing tunnel, and construct the new rebuilt tunnel. Each of the three Build Alternatives would use the LOD in a different manner, as described in Section 3.3.1.2. Regardless of the Build Alternative, a large swath of open grassy field and the fenced dog area would not be available during construction. However, the Virginia Avenue Community Garden would not be displaced, and would remain open throughout construction. The park benches and picnic tables located near Potomac Avenue would not be displaced under any of the Build Alternatives. Noise and dust resulting from construction activities within the park would degrade the park experience of garden users and park visitors.

Alternative 4's construction area in the park is smaller than the other two Build Alternatives because it does not include the proposed tunnel split (see Section 3.3). However, in terms of the duration of park occupancy, Alternatives 2 and 3 would occupy a portion of the park for 30 to 36 months, the same as the entire duration of construction for these alternatives. Alternative 4 would occupy a portion of the park for 38 to 54 months or 20 to 24 percent shorter than its entire construction duration. In addition, Alternative 3 would operate trains within a tunnel at all times within the park, which may open up the possibility that a portion of the construction area (the areas near or partially over the new south side tunnel) could be returned back to park uses during construction. The Project would restore Virginia Avenue Park to its pre-construction condition at the conclusion of construction. CSX has committed to provide some enhancements and upgraded amenities in coordination with NPS and DPR.

As noted in Section 5.14, each of the three Build Alternatives would require the relocation of the Tiber Creek & New Jersey Avenue High Level Intercepting Sewer. This particular work is located adjacent to the west portal at 2nd Street SE and would require closing the area under I-695 for most of the construction period. Post-construction, the pavement would be restored and control of the property would be given back to DDOT, who would then decide how to use this area.

No other park or recreational facility would be directly affected during construction, including the Marine Barracks Turf Field and Garfield Park. However, pedestrian access to Garfield Park from 2nd Street SE on the south side of I-695 would not be available during construction largely because of the Tiber Creek Intercepting Sewer work noted above. No other Garfield Park access point would be affected. The park is accessible from several different locations, including from New Jersey Avenue SE and 3rd Street SE from the south side of I-695. Fencing as identified in Section 3.3.1.5 (Safety and Security) would be installed between the construction area for the Tiber Creek sewer relocation work and Garfield Park to separate construction activities from the park.

The LOD needed by the Build Alternatives would not encroach into the Marine turf field. Similar to the measures identified near Garfield Park, fencing as identified in Section 3.3.1.5 (Safety and Security) would be installed along the perimeter of the LOD within the Marine Corps Recreation Facility, which would separate construction activities from the field.. Access to the turf field is through L Street SE, not Virginia Avenue SE.

Due to the Project's MOT plan, construction on Virginia Avenue SE would not affect access to other nearby parks, other than what is noted above.

At the conclusion of construction, the Project would restore affected areas of Virginia Avenue Park to their pre-construction conditions.

5.12.2 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in potentially similar impacts described under the Construction Impacts for the Build Alternatives. Nevertheless, no long-term impacts to parks and recreational resources are anticipated to occur as a result of Alternative 1.

As noted above, the Project would restore Virginia Avenue Park to its pre-construction conditions. Once the park has been restored, its resources would revert back to their pre-construction conditions as described in Section 4.12. The Project would not affect access to and user enjoyment of Virginia Park.

The Project would facilitate partial construction of the Garfield Connector, a planned connection between Garfield Park and the Anacostia Riverfront and Canal Park for cyclists and pedestrians. The area between Garfield Park and Virginia Avenue SE, in the vicinity of the west portal at 2nd Street SE, which is largely underneath I-695, would be completely rebuilt due to the relocation of the Tiber Creek & New Jersey Avenue High Level Intercepting Sewer. Within the project's LOD, the area would be made to be accessible for wheelchair-dependent persons. DDOT will decide future uses of this area in consultation with other District agencies, the Garfield Park Association and the larger community.

5.12.3 Section 6(f)

5.12.3.1 Legal and Regulatory Context

Section 6(f) of the Land and Water Conservation Fund (LWCF) Act - (codified at 16 U.S.C. 460I-4 et seq) states that:

"No property acquired or developed with assistance under this section shall, without the approval of the Secretary [of the Interior], be converted to other than public outdoor recreation uses. The Secretary shall approve such conversion only if he finds it to be in accord with the then existing comprehensive statewide outdoor recreation plan and lonely upon such conditions as he deems necessary to assure the substitution of other recreation

properties of at least equal fair market value and of reasonably equivalent usefulness and location.”

This statute applies to a property, as a whole, that has received funding under the LWCF Act, regardless of where the resources were spent within an area.

Section 6(f) is intended to protect parks and other recreational resources from conversion to other uses. The Section 6(f) park conversion process applies only to those state, county, or local recreational resources that have received funding through the LWCF Act. The NPS makes the ultimate decision on whether to approve a conversion of land that has received funding under the LWCF Act. The NPS will consider conversion of public outdoor recreation areas to another use, if the following prerequisites have been met:

- All practicable alternatives to the conversion have been evaluated and rejected on a sound basis;
- The property proposed for substitution is of at least fair market value as that of the property to be converted; and
- The property proposed for replacement is of reasonable equivalent usefulness and location for recreational purposes as that being converted.

5.12.3.2 Description of Section 6(f) Properties

The Virginia Avenue Park is the result of a land transfer from the 1960s. It was historically known as the Virginia Avenue Boxing Center, which was demolished in 2003 and followed by implementation of a landscaping program. Virginia Avenue Park is identified as one of the District's 71 recreational centers, and LWCF Act funds were used to improve the park.

5.12.3.3 Potential Impacts on Section 6(f) Properties

Although Build Alternatives would require a temporary occupancy of a portion Virginia Avenue Park during construction, the Project would not lead to a conversion of the park to other uses because the construction impacts are temporary and Virginia Avenue Park would be restored to its pre-construction condition at the conclusion of construction.

5.12.3.4 Section 6(f) Coordination

The NPS is a cooperating agency in the preparation of this Draft EIS. Coordination with the NPS would continue throughout the NEPA process, final design and construction to ensure that Virginia Avenue Park is restored to its pre-construction condition and enhanced for the betterment of the community.

5.12.4 Mitigation Measures

As there is no conversion of Section 6(f) lands attributable to the Project, there is neither a statutory obligation to replace converted lands. Nevertheless, at the conclusion of this Project, CSX would provide the affected community with a number of general benefits beyond conventional mitigation measures undertaken as part of the NEPA process. These general

benefits are expected to include enhancements to Virginia Avenue Park, and thereby acknowledge the temporary use of this Section 6(f) land for this Project.

Temporary wayfinding signs would be provided showing alternatives routes (New Jersey Avenue SE and 3rd Street SE) to Garfield Park from the south side of I-695.

5.13 Visual and Aesthetic Conditions

5.13.1 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 would not result in impacts to visual and aesthetic conditions within the LOD. The discussion provided in the Construction Impact section for Visual and Aesthetic Resource focuses exclusively on the three Build Alternatives.

Any of the Build Alternatives would require the closure of Virginia Avenue SE, and part of Virginia Avenue Park in order to demolish the existing tunnel, build the new tunnel, and maintain freight rail operations. Along these areas, fencing and barriers would be erected around all construction sites, including anywhere that freight trains are operating (e.g., runaround trench under Alternative 2). The purpose of the fencing is to demarcate the construction area, but to also protect the general public from the construction site. How the fencing (and some

construction equipment) may appear along Virginia Avenue is shown in three illustrations providing renderings from vantage points on Virginia Avenue SE at 3rd, 4th and 5th Streets SE. Much of the construction work (and any train operations) would be conducted below street level,

and would be largely not visible from street level. However, a viewer within a nearby building with at least three levels would be able to look into the construction site over the fencing and possibly peek into the trenching containing the reconstruction work and train operations if running in an open protected trench (see enclosed visual renderings).

Rendering at 3rd Street SE, Looking East



The construction-period visual impacts of the Build Alternatives are largely the same. However, construction visual impacts of Alternative 4 are anticipated to last between 54 to 66 months, whereas these same impacts would last between 30-42 months under Alternatives 2 or 3.

Rendering at 4th Street SE, Looking West



Rendering at 5th Street SE, Looking East



5.13.2 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in potentially some of the impacts described under the Construction Impacts for the Build Alternatives. Alternative 1 would not require any changes to the Virginia Avenue SE streetscape and therefore, no long-term impacts to the visual and aesthetic resources along Virginia Avenue are anticipated to occur as a result of Alternative 1.

Under the Build Alternatives, Virginia Avenue SE streetscape would be restored, potentially in a slightly different appearance with the possible addition of more landscaped areas, the provision of bicycle facilities and the reduction of lanes. Initially, the street trees planted along Virginia Avenue as part of the restoration would generally be younger with smaller canopies than the existing street trees that would be displaced by the Project (note that the tree inventory provided in Appendix H indicate that some of those trees are in poor health, dying, or dead). The immediate impact would be a lessening of the visual relief the street trees provide between the visual conflict of I-695 on the north side of Virginia Avenue SE and the row houses, and other land uses, on the south side. The 300 and 400 blocks of Virginia Avenue SE with the row houses (Capitol Quarter) have a neighborhood aesthetic feel, in part because of the type of housing, but also because of the street trees that somewhat mitigate the visual intrusion of the elevated I-695. Between 5th/6th and 8th Streets SE, the street trees are also a factor in the overall aesthetic environment. As the years goes by and as trees grow larger with fuller canopies, the street trees could enhance the visual environmental along Virginia Avenue SE.

The immediate post-construction visual changes in Virginia Avenue Park after its restoration would be less acute than along Virginia Avenue SE simply because the displaced trees in the park are not as mature as many of the street trees. Opportunities to plant more trees and other vegetation, change grading, and provide other improvements as part of the restoration of the park could enhance its overall visual and aesthetic appearance.

5.13.3 Mitigation Measures

Because land uses vary along Virginia Avenue SE, the type of fencing or barrier may vary as well. The areas of most concern are between 3rd and 5th Streets SE, due to the cluster of residences at this location, and in Virginia Avenue Park. Within these areas, screens would be attached to the chain link fencing facing the residences or the park. Alternatively, stockade fencing may be used in lieu of chain link fencing with screens. The advantages of stockade fencing are they could be used to display public art, such as allowing school children to paint murals on the fencing.

The contractor would be required to conduct good housekeeping practices, such as making sure equipment is orderly parked when not in use, daily regular clean-up is conducted, and that soil stockpiles are stabilized as required by District regulations

5.14 Utilities

5.14.1 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 would not require utility relocations. The discussion provided in the Construction Impact section for Utilities focuses exclusively on the three Build Alternatives.

There are no discernable differences among the Build Alternatives in terms of their utility relocations. The affected utilities include storm and sanitary sewer; water; natural gas; electric power; and communications. Tables 5-16 through 5-20 summarize how utilities under these categories would be affected by the Build Alternatives. In general, the affected utilities would either be relocated (includes replacement or modification), protected (not moved but protected from damage due to the construction of the Project) or supported-in-place (not moved but provided additional structural support). These terms are used in Tables 5-16 through 5-20. The locations of the affected utilities are shown on Figures 5-3 through 5-7.

Table 5-16
Storm and Sanitary Sewer Lines Affected by the Build Alternatives

Item*	Description	Impact
A	Tiber Creek Sewer	Relocate
B	12" Sewer Line	Relocate
C	15" Storm Sewer Line	Relocate
D	12" Combined Sewer Line	Relocate
E	36" Combined Sewer Line	Relocate
F	10" Sewer Line	Relocate
G	4'6" Concrete and Brick Combined Sewer Line	Relocate
H	12", 18" and 24" Storm Sewer Lines	Relocate
I	Capitol Relief Sewer Line (14.83' x 19.5')	Protect and Support-in-Place
J	54" Reinforced Concrete Storm Sewer Line	Protect
K	66" Combined Sewer Overflow Line	Protect
L	18" Encased Combined Sewer Line	Relocate
M	15" Storm Sewer Line	Relocate

Notes: *See Figure 5-3 for location of storm or sanitary sewer lines

Figure 5-3
Storm and Sanitary Sewer Lines Affected by the Build Alternatives

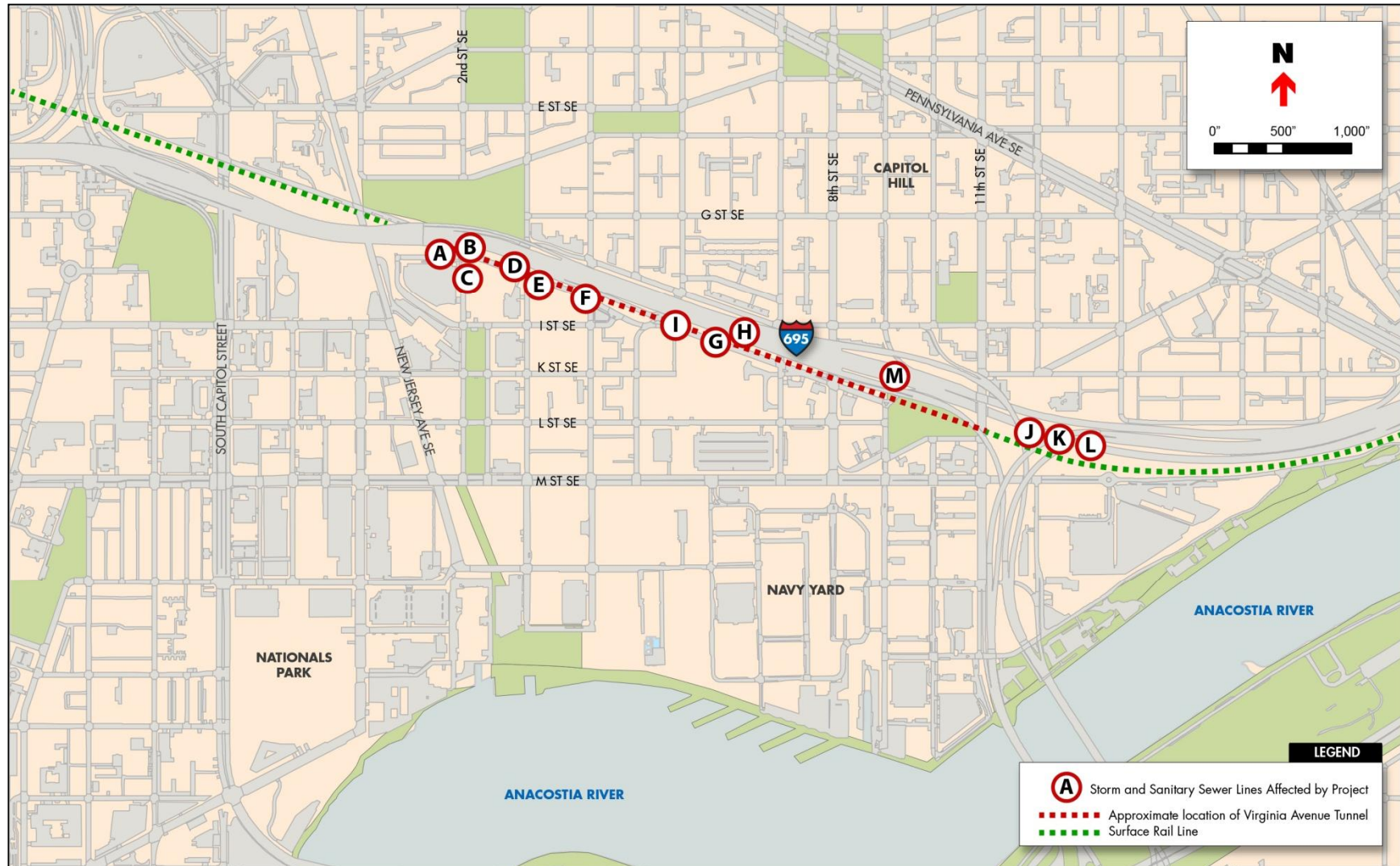


Table 5-17
Water Lines Affected by the Build Alternatives

Item*	Description	Impact
A	12" Water Line	Relocate
B	8" Water Line	Relocate
C	12" Water Line	Protect and Support-in-Place
D	12" Water Line	Relocate and Support-in-Place
E	12" Water Line	Protect and Support-in-Place
F	20" Water Line and Two 12" Water Lines	Protect and Support-in-Place
G	10" Water Line	Relocate
H	3" Water Line	Relocate
I	30" Water Line	Relocate and Support-in-Place

Notes: *See Figure 5-4 for location of water lines

Table 5-18
Natural Gas Lines Affected by the Build Alternatives

Item*	Description	Impact
A	3" Gas Line	Relocate
B	Low Pressure 8" Gas Line	Support-in-Place
C	6" Gas Line	Relocate and Support-in-Place
D	2" Gas Line	Relocate
E	8" Gas Line	Relocate and Support-in-Place
F	Low Pressure 4" Gas Line	Relocate
G	24" Gas Lines	Relocate and Support-in-Place
H	Two 24" Gas Lines	Protect
I	2" Gas Lines	Relocate

Notes: *See Figure 5-5 for location of natural gas lines

Figure 5-4
Water Lines Affected by the Build Alternatives



Figure 5-5
Natural Gas Lines Affected by the Build Alternatives

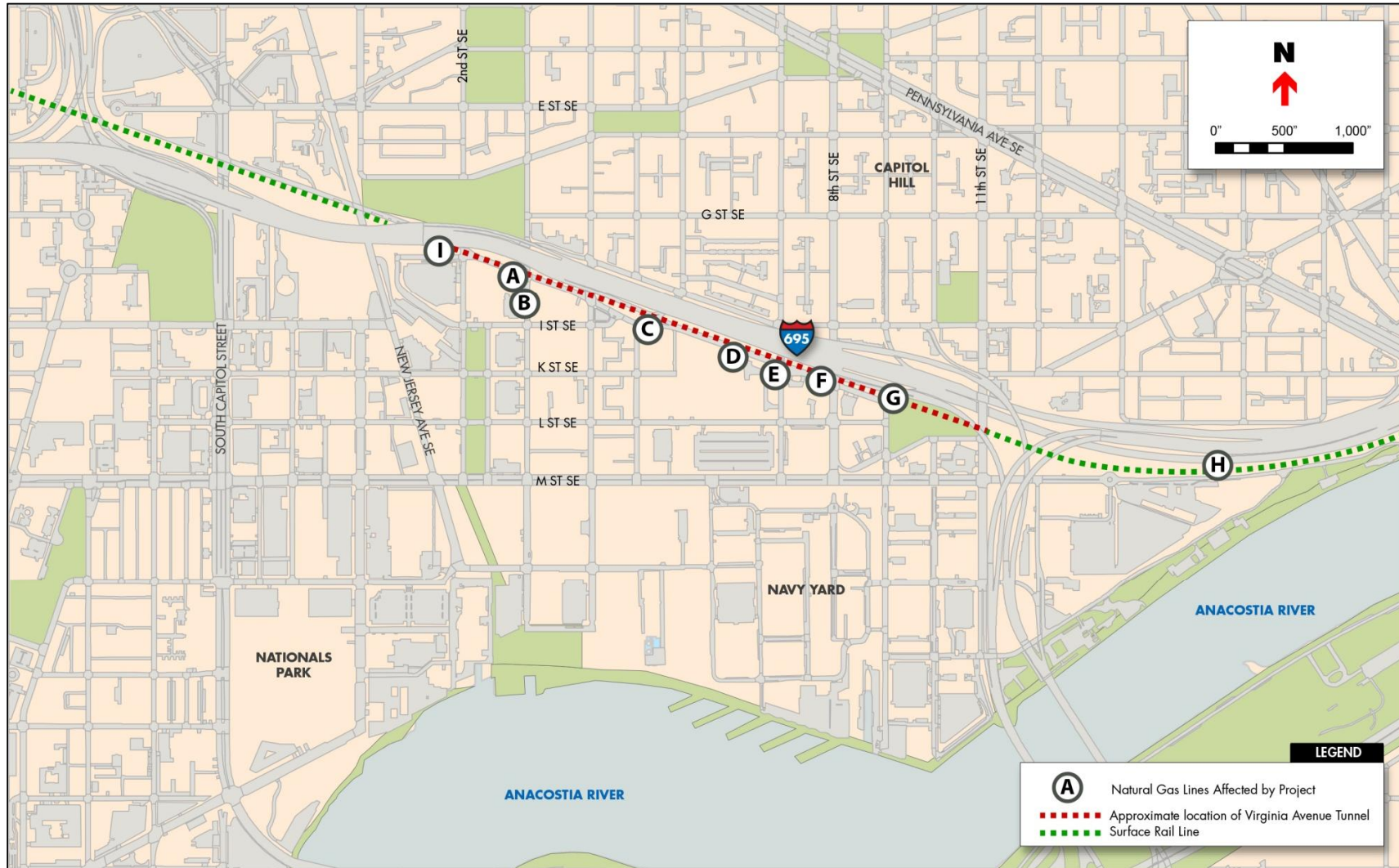


Table 5-19
Electric Power Lines Affected by the Build Alternatives

Item*	Description	Impact
A	Two 3-Way 132KV Electric Ductbank	Remove/Inactive
B	4-Way 13 KV Electric Ductbank	Relocate and Support-in-Place
C	8-Way 13KV Electric Ductbank	Relocate and Support-in-Place
D	4-way Electric Ductbank	Relocate
E	4-Way Electric Ductbank	Relocate and Support-in-Place
F	4-Way Electric Ductbank	Support-in-Place
G	4-Way 13KV Electric Ductbank	Relocate and Support-in-Place
H	4-Way Electric Ductbank	Relocate
I	4-Way 13KV Electric Ductbank	Relocate and Support-in-Place
J	8-Way 13KV Electric Ductbank	Support-in-Place
K	4-Way 69 KV Electric Ductbank	Relocate and Support-in-Place
L	4-Way 13 KV Electric Ductbank	Relocate and Support-in-Place
M	12-Way Electric Ductbank	Relocate
N	4-Way Electric Ductbank	Relocate
O	12-Way 4 KV Electric Ductbank	Protect and Support-in-Place
P	1-Way Electric Ductbank	Relocate

Notes: *See Figure 5-6 for location of electric power lines

Table 5-20
Communication Lines Affected by the Build Alternatives

Item*	Description	Impact
A	AboveNet Communications Conduit	Relocate
B	Level 3 20-Way Ductbank	Support-in-Place
C	9-Way Communications Ductbank	Relocate and Support-in-Place
D	9-Way Communications Ductbank	Relocate and Support-in-Place
E	2-Way Communications Ductbank	Relocate and Support-in-Place
F	2-Way Communications Ductbank	Support-in-Place
G	9-Way, 14-Way, and 18-Way Communication Ductbanks	Relocate

Notes: *See Figure 5-7 for location of communication lines

None of the Build Alternatives would remove active utilities from the LOD (without replacing them). Affected utilities would be upgraded to current standards. Moreover, in coordination with the affected utility companies, redundant utilities would be eliminated where possible. Abandoned utilities that conflict with construction of the Project could be removed following appropriate protocols with the owners of the abandoned utilities.

Figure 5-6
Electrical Power Lines Affected by the Build Alternatives

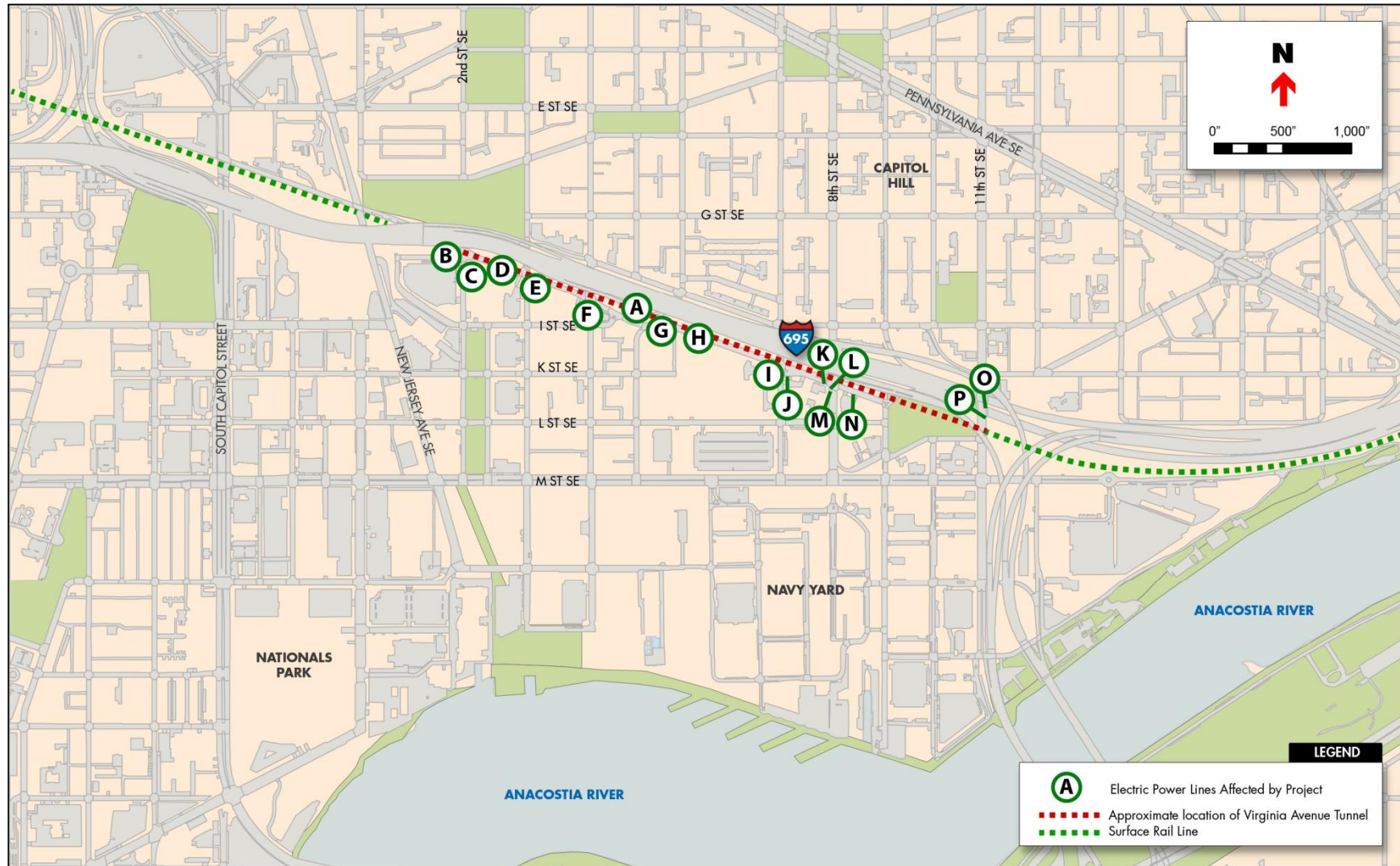
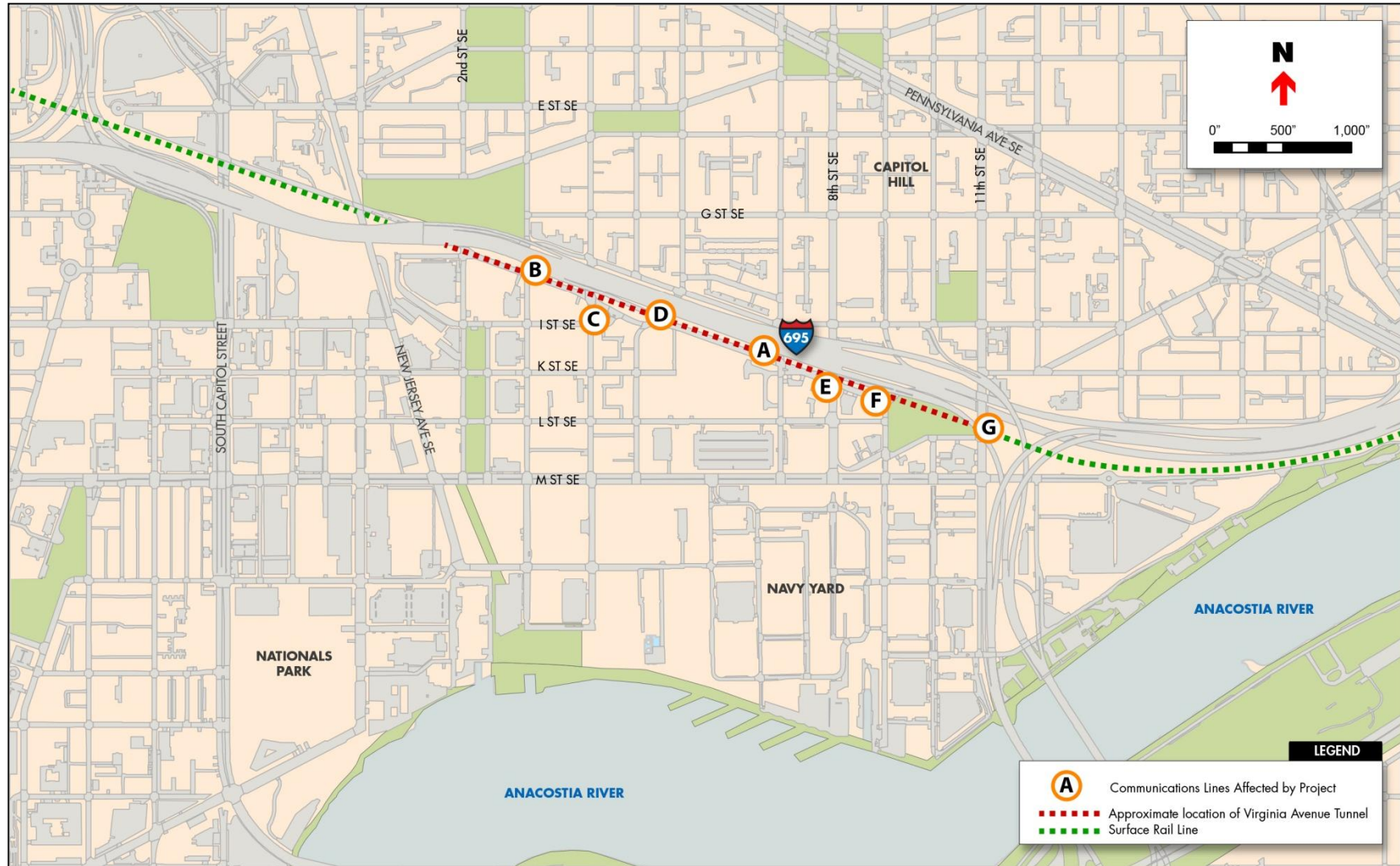


Figure 5-7
Communication Lines Affected by the Build Alternatives



Utility relocations or modifications would be conducted in a manner that would maintain service to the utility customers to the fullest extent possible. However, certain temporary service disruptions would be unavoidable. Coordination with the utility owners would be conducted to limit any service disruptions to as short duration as possible. In addition, all utility removal and relocation work would be conducted within the LOD described in Section 3.3.1.1. A utility relocation plan would be prepared during final design for notifying the public about utility service disruptions. Best management practices and requirements of the affected utility companies would be strictly followed, including making sure that all required permits and approvals are obtained.

In addition to the required utility relocations, the heating-ventilation-air conditioning unit (HVAC) of the Marine Corps Recreation Facility would have to be temporarily or permanently repositioned under each of the Build Alternatives. The HVAC is located near Virginia Avenue SE property line. Coordination with the Marine Corps would be conducted to maintain the operation of the HVAC unit during construction. In addition, water lines as shown as Item F in Table 4-17 may be relocated within the Marine Corps property.

Despite the extensive research and coordination with utility companies that have been conducted to date to determine the locations of the affected utilities listed in Tables 5-16 through 5-20, unknown utilities could be discovered during construction. The utility relocation plan would address the handling of unexpected utilities. In general, they would be handled in the same manner as other utilities affected by construction.

5.14.2 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 scenario could result in potentially similar impacts described under the Construction Impacts for the Build Alternatives. Nevertheless, no long-term impacts to utilities are anticipated to occur as a result of Alternative 1 (No Build).

The reconstruction of Virginia Avenue Tunnel under any of the Build Alternatives would not result in post-construction impacts on the utility services.

5.14.3 Mitigation

Coordination with utility companies would be conducted throughout the design and construction phases of the Project. Whenever possible, service disruptions would be avoided. If a service disruption is unavoidable, public notification requirements of the affected utility company would be followed, in addition to the Project's outreach program. In addition, every attempt would be made to conduct the utility work during non-peak usage hours.

5.15 Transportation

5.15.1 Freight Operations

5.15.1.1 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 would maintain current freight operations as described in Section 4.15.1. The discussion provided in the Construction Impact section for Freight Operations focuses exclusively on the three Build Alternatives.

During construction of the Project, all Build Alternatives would maintain a single railroad track that would allow operations in both directions (the same as current conditions and the current level of freight traffic). The Project contemplates continued active rail operations averaging 18 trains per day, but could range between 12 to 30 trains on a daily basis during construction. (Note that for purposes of evaluating potential train operations noise impacts during construction, a 25 percent increase from existing conditions was assumed.) All alternatives allow freight trains to operate at a maximum 25mph.

The three Build Alternatives have certain operational advantages or disadvantages in comparison to one another:

- Alternative 2 would provide the ability to accommodate double-stack intermodal container freight trains sooner than the other two Build Alternatives because the runaround track could be constructed relatively quickly in the terms of the overall construction duration.
- Trains operating under Alternative 3 would always be inside a tunnel, except a 230 feet section immediately east of the west portal at 2nd Street SE, which does not extend beyond 3rd Street SE;
- Alternative 4 would pose the greatest risks of service disruptions because temporary train operations and reconstruction of the tunnel would occur within the same trench. This would require additional operational and safety precautions and measures onto Alternative 4, and not under Alternatives 2 and 3, which would keep train operations and construction activities separated.

5.15.1.2 Post-Construction Impacts

In order to determine the Project's effect on post-construction freight operations, future rail traffic demand must be considered. Government and industry information indicate that the amount of freight rail transportation is expected to substantially increase over the coming decades regardless if the Project is built or not. However, due to the variability of factors such as commodity flows, national and international economic conditions, cyclical variations, and emerging needs and commodities in the fast-evolving freight industry, it is generally difficult to predict the future growth of freight traffic on any corridor accurately. However, the FHWA estimates that the total U. S. freight shipments would grow by 50 percent over the next 30 years. Also, it is generally accepted in the freight transportation industry that the opening of

the expanded Panama Canal in 2015 would lead to a substantial growth in container traffic demand along the east coast of the U.S. Thus, it is expected that freight traffic along the east coast of the U.S. is due for substantial growth as well. Sizeable fluctuations in freight traffic are typical in the railroad industry and as a part of their operating franchise, railroads have the inherent freedom to expand or contract capacity as traffic demands vary. However, it must also be understood that investments in capital and expansion infrastructure in railroad entails long-term durations, which means improvements must accommodate fluctuations in rail traffic during and at the completion of the improvement projects.

The Build Alternatives would provide the same post-construction railroad operating conditions. This would be an improvement over Alternative 1, which would maintain the current one-track configuration, as well as the inability to accommodate double-stack intermodal container freight trains. In addition, an emergency or unplanned major repair or rehabilitation under an Alternative 1 scenario could potentially result in substantial freight service disruptions. Depending on the severity of the repair or rehabilitation, wide ranging effects to the rail network could occur.

The Build Alternatives would provide capacity improvements through the District and the eastern seaboard freight rail network by adding a second railroad track within Virginia Avenue Tunnel and by providing the necessary vertical clearance to accommodate rail traffic pulling double-stack intermodal container cars.

The provision of two railroad tracks and the adequate clearance to allow double-stack intermodal container trains traffic would be a particularly important attribute of the post-construction Virginia Avenue Tunnel. The two-track operation would allow for trains moving in opposite directions to simultaneously operate through the tunnel, which would reduce the overall time trains spend idling and improve the efficiency for the eastern seaboard freight rail network. Some of this efficiency may extend to passenger rail service since they use CSX rails in the Washington Metropolitan Area. The ability to accommodate double-stack intermodal container trains essentially doubles the capacity for this particular freight transportation market along the network. It would allow the same numbers of operating trains to handle growth in intermodal container traffic of up to 100 percent increase in comparison to existing conditions. In other words, in comparison to Alternative 1, the Build Alternatives would allow CSX to move the same amount of freight with fewer trains.

5.15.1.3 Mitigation Measures

Because no adverse impacts to train operations are expected to occur during construction and freight transportation would be enhanced following construction, no mitigation measures are necessary. As noted in Section 5.6.4 (Noise Mitigation), CSX has concluded that its mandatory practice of requiring every train to blow its horns while entering and exiting the tunnel is no longer necessary. Locomotive engineers do however have the discretion and authority to blow horns for safety reasons in accordance with industry practices and federal regulations.

5.15.2 Roadway Network

5.15.2.1 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 would not result in impacts to the roadway network. The discussion provided in the Construction Impact section for the Roadway Network focuses exclusively on the three Build Alternatives.

Regardless of the Build Alternative, the reconstruction of Virginia Avenue Tunnel would require the closing Virginia Avenue SE between 2nd and 9th Streets SE for the duration of the construction period. Temporary decking would be provided at all cross streets for autos, pedestrians and cyclists on existing cross streets including from 3rd to 8th Streets SE. However, the pedestrian path to Garfield Park from 2nd Street SE on the south side of I-695 would not be available during construction largely because of the Tiber Creek Intercepting Sewer (see Sections 5.12 and 5.14). Erecting the temporary decks at 5th/6th and 8th Streets SE may require the short term closure of I-695 ramps located at these locations. The closure of Virginia Avenue SE for this Project is two-phased. For Alternatives 2 and 3, a single eastbound lane on Virginia Avenue SE (northernmost lane) would be maintained between the I-695 off-ramp at 6th Street SE and the 8th Street SE intersection during the first phase. Keeping this lane open would allow traffic exiting I-695 to make left turns at 7th and 8th Streets SE from the eastbound Virginia Avenue SE, the same movements currently allowed. Under Alternative 4, the first several months of construction would be concentrated in the area between 2nd and 5th/6th Streets SE. The I-695 6th Street off-ramp and the section of Virginia Avenue SE between 6th and 9th Streets SE would be unaffected. During Phase 2, the remaining section of Virginia Avenue SE south of I-695, between 5th/6th and 8th Streets SE, would be closed under each of the three Build Alternatives.

To address the required closure of Virginia Avenue SE to construct the Project and to ensure that vehicular, pedestrian and bicycle mobility is maintained throughout the construction period, a MOT plan was prepared, and described in Section 3.3.1.4. It took into consideration the construction phasing of the Build Alternatives, as described in Section 3.3.1.2, and the schedules of other construction activities located in the general vicinity of the LOD that may overlap with construction of the Project. These other projects include:

- 11th Street Bridges Project;
- DC Water's Clean Rivers Project;
- Park Chelsea (DC Square 737); and
- National Community Church/Square 906.

The MOT plan also includes accommodations to maintain vehicular access (including emergency response vehicles) to all properties with current driveways on Virginia Avenue SE between 2nd and 9th Streets SE. These properties are identified in Section 3.5.1.4.

The MOT plan effects on traffic in the general vicinity of the LOD are discussed in Section 5.15.3.

5.15.2.2 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in potentially similar impacts described under the Construction Impacts for the Build Alternatives. Nevertheless, no long-term impacts to the roadway network are anticipated to occur as a result of Alternative 1.

Regardless of the Build Alternative, the Project would restore Virginia Avenue SE to its pre-construction condition. It is possible that the Project may make the following changes to this street as described in Section 3.3.2.2:

- Provide a bicycle lane and/or shared-use pedestrian/bicycle path between 2nd and 9th Streets SE;
- Provide two possible roadway configurations between 4th and 5th/6th Streets SE;
- Straightening the Virginia Avenue SE alignment between 4th and 5th/6th Streets SE;
- Reduce the number of lanes from four to three between 5th and 7th Streets SE;
- Provide additional on-street parking where appropriate;
- Convert the section between 8th and 9th Streets SE from one-way to two-way operations; and
- Provide improved street lighting, traffic signals and crosswalks.

The Project essentially provides the opportunity to make physical changes to Virginia Avenue SE if desired by DDOT in consultation with the community. The specifics of these physical changes (e.g., type of bicycle facility, etc.) would be determined during final design or during construction of the new tunnel. Principles such as context sensitive design would be considered. For purposes of this EIS, however, predicted long-term traffic conditions along Virginia Avenue SE as provided in Section 5.15.3 assumed certain conditions, in particular the reduction of lanes from four to three between 5th and 7th Streets SE.

As described in Section 3.3, the Build Alternatives were designed to avoid risking the structural integrity of I-695. In addition, existing and new columns associated with the rebuilt 11th Street Bridges, now under construction, were considered in the conceptual design of the Build Alternatives (see Section 3.3). Although the specifics of the tunnel alignment would vary by Build Alternative, due to the coordination between this Project and the 11th Street Bridges project, the new tunnel within the 11th Street Bridge right-of-way would not structurally or operationally affect I-695 when completed and in the foreseeable future. Alternative 1 would not change the tunnel alignment.

5.15.2.3 Mitigation Measures

The effects of roadway closures needed to construct the Project would be mitigated by implementing the MOT plan described in Section 3.3.1.4.

5.15.3 Traffic Conditions

This section summarizes the results of traffic impact analyses conducted for the Project and documented in a report provided in Appendix J. The traffic impact analysis covers both phases of the MOT plan as well as the post-construction period in a year 2040 time frame.

5.15.3.1 Construction-Period Impacts

To analyze the construction impacts of the Build Alternatives, the year 2015 was selected as analysis year based on the anticipated construction start by early 2014. Tables 5-21 and 5-22 provide the predicted peak morning (AM) and afternoon (PM) levels-of-service (LOS) at signalized and un-signalized intersections, respectively, in the general vicinity of the LOD. The traffic conditions under all of the Build Alternatives, and operating under the MOT plan described in Section 3.3.1.4, would be the same. Tables 5-21 and 5-22 also show predicted intersection conditions for Alternative 1, which would not involve any construction in the short term. This scenario serves as the baseline condition to evaluate the traffic conditions under the Build Alternatives with the MOT plan in place. The traffic analysis considered new traffic generation caused by upcoming developments, such as the 200 I Street building.

The traffic analysis herein provided uses level-of-service (LOS) as a measure to describe the quality of the traffic conditions through a given roadway segment or an intersection. As described in Section 4.15.3, LOS is measured on a scale of A through F, with LOS A representing the best operating conditions with little or no delay and LOS F representing the worst with unacceptable delays. Table 5-21 contains the LOS definitions. The locations of the analyzed intersections are provided on Figure 5-8.

Table 5-22 shows predicted traffic conditions under Alternative 1 or the no build condition. Because these traffic conditions are just two or three years in the future from existing traffic conditions, as provided in Table 4-15, the level-of-service values shown in Table 5-21 for Alternative 1 are very similar to existing conditions.

Table 5-21
Level-of-Service Definitions

LOS Level	Definition
A	Free flow conditions
B	Reasonably free flow conditions
C	Stable flow conditions
D	Approaching unstable flow conditions
E	Unstable flow conditions
F	Forced or breakdown flow conditions

Source: Highway Capacity Manual

Table 5-22
Construction-Period Predicted Peak Hour Level-of-Service (and Overall Delay) at Selected
Signalized Intersections in the General Vicinity of the Project

Loc*	Intersection	Alternative 1		Build Alternatives					
				Phase 1A		Phase 1B		Phase 2	
		AM	PM	AM	PM	AM	PM	AM	PM
1	South Capitol St and I St SE (Left)	B (11.7)	B (15.8)	B (11.7)	B (15.8)	B (11.7)	B (15.8)	B (11.7)	B (15.8)
2	South Capitol St and I St SE (Right)	C (20.4)	C (23.8)	C (20.4)	C (23.8)	C (20.4)	C (23.8)	C (20.4)	C (23.8)
3	Ramps from freeway at South Capitol St SB	F (155.4)	D (48)	F (155.4)	D (48)	F (155.4)	D (48)	F (155.4)	D (48)
4	South Capitol St at M St SE – Southbound Intersection	F (520.5)	E (61.8)	F (520.5)	E (61.8)	F (520.5)	E (61.8)	F (520.5)	E (61.8)
5	South Capitol St at M St SE – Northbound Intersection	F (88)	F (146.5)	F (88)	F (146.5)	F (88)	F (146.5)	F (88)	F (146.5)
6	M St SE at 1 st St SE	E (57.8)	F (83.6)	E (57.8)	F (83.6)	E (57.8)	F (83.6)	E (57.8)	F (83.6)
7	M St SE at New Jersey Ave SE	B (16.4)	B (15.2)	B (16.4)	B (15.2)	B (16.4)	B (15.2)	B (16.4)	B (15.2)
8	M St SE at 3 rd St SE	A (8.2)	B (14.6)	A (8.2)	B (14.6)	A (8.2)	B (14.6)	A (8.2)	B (14.6)
9	M St SE at 4 th St SE	C (20.2)	B (16.2)	C (20.2)	B (16.2)	C (20.2)	B (16.2)	C (20.2)	B (16.2)
10	M St SE at 8 th St SE	B (18.6)	F (136.9)	D (49.7)	F (151.9)	C (23.3)	F (135)	C (23.9)	C (20.1)
11	M St SE at 9 th St SE	B (13.3)	B (15)	B (16.3)	C (27.3)	B (13.5)	B (14.7)	B (11.4)	B (17.8)
12	M St SE at 11 th St SE	C (23.9)	F (139.1)	C (24.1)	F (234.4)	C (24.1)	F (238.8)	C (24.4)	F (163.1)
13	Virginia Ave SE EB at 5 th St SE	D (35.1)	D (47)	N/A	N/A	N/A	N/A	N/A	N/A
14	I-695 off-ramp at 6 th St SE/Virginia Ave SE (south of I-695)	B (17.6)	B (11.5)	C (31.7)	C (21.8)	C (31.7)	C (21.8)	B (12.9)	B (12.8)
15	Virginia Ave SE at 7 th St SE (south of I-695)	A (6.2)	B (17.7)	C (20.3)	D (35.3)	C (20.3)	D (35.3)	N/A	N/A

Table 5-22 (continued)
Construction-Period Predicted Peak Hour Level-of-Service (and Overall Delay) at Selected
Signalized Intersections in the General Vicinity of the Project

Loc*	Intersection	Alternative 1		Build Alternatives					
				Phase 1A		Phase 1B		Phase 2	
		AM	PM	AM	PM	AM	PM	AM	PM
16	Virginia Ave SE at 8 th St SE (south of I-695)	C (32.1)	D (47.3)	N/A	N/A	N/A	N/A	N/A	N/A
17	Virginia Ave SE ramp at 8 th St SE (south of I-695)	B (12)	B (15.4)	B (17.6)	D (40.5)	C (22.4)	D (51.1)	A (1.8)	A (3.1)
18	I St SE at 8 th St SE	B (19.1)	C (20.1)	B (19.1)	C (20.1)	B (19.1)	C (20.1)	D (35.7)	C (23.8)
19	I St SE at Virginia Ave SE/7 th St SE (north of I-695)	A (8.4)	B (12)	A (8.4)	B (12)	A (8.4)	B (12)	E (55.3)	C (23.3)
20	I St SE and Virginia Ave SE at 6 th St SE (north of I-695)	A (7.2)	C (28.3)	A (7.2)	C (28.3)	A (7.2)	C (28.3)	D (41.1)	C (25.1)
21	Virginia Ave SE at 4 th St SE (north of I-695)	C (30.3)	C (22.6)	C (30.3)	C (22.6)	C (30.3)	C (22.6)	C (30.3)	C (22.6)
22	Virginia Ave SE at 3 rd St SE (north of I-695)	D (46.2)	F (125.4)	D (46.2)	F (125.4)	D (46.2)	F (125.4)	D (46.2)	F (125.4)
23	G St SE at 8 th St SE	A (9.1)	B (10.9)	A (9.1)	B (10.9)	A (9.1)	B (10.9)	B (12.7)	B (16.5)
24	M St SE at Isaac Hall Ave SE	A (5.3)	B (17.5)	A (5.3)	B (17.5)	A (5.3)	B (17.5)	A (5.3)	B (17.5)

Notes: * See Figure 5-8 for location of intersection

Numbers in parentheses represent overall intersection delay in seconds

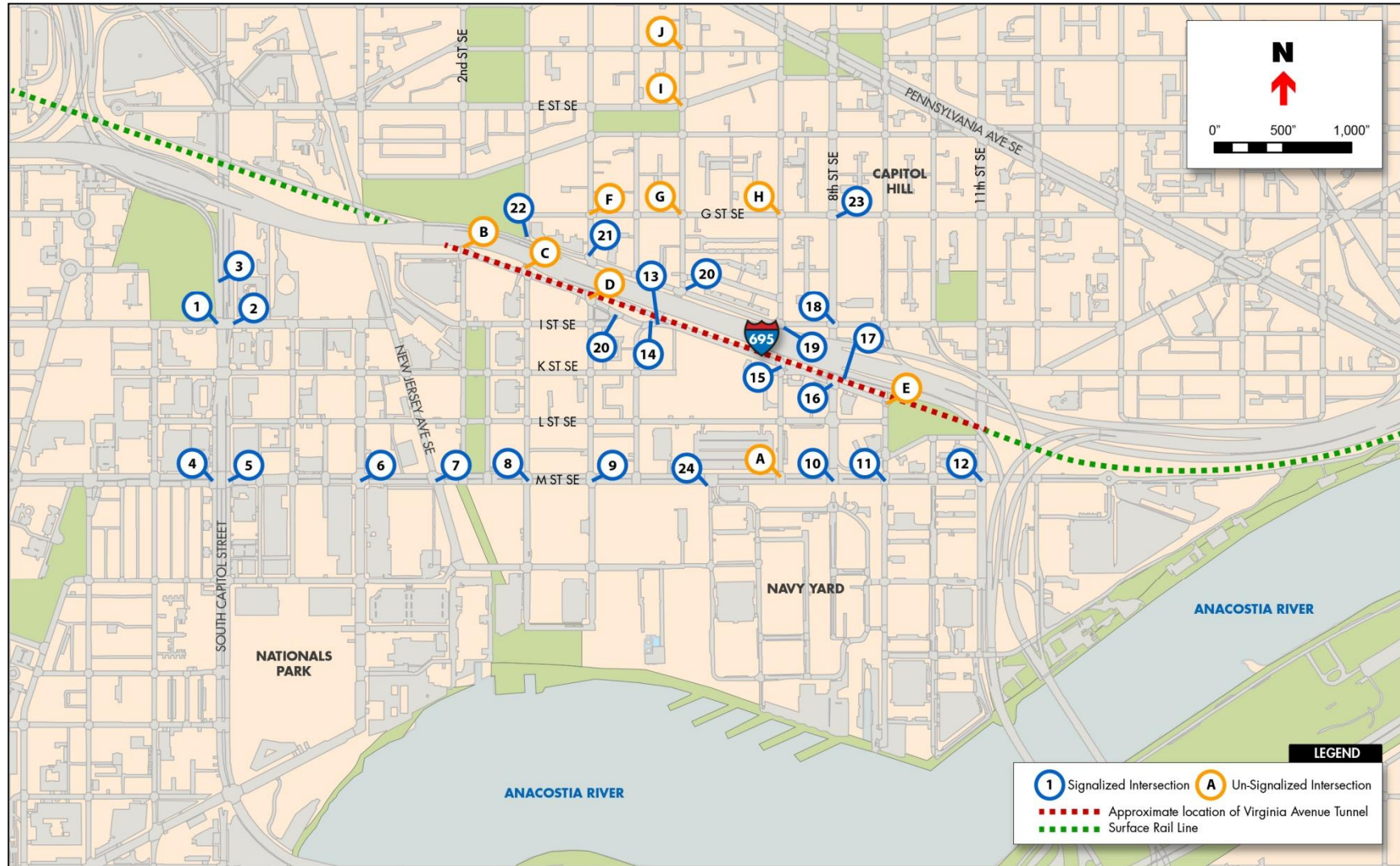
N/A: Full intersection not available due to the MOT or the 11th Street Bridges project

Yellow cell indicates change from Alternative 1 or change from previous MOT phase

Blue cell indicates no change from previous MOT phase

Uncolored cell means that traffic conditions would be exactly the same as under Alternative 1

Figure 5-8
Analyzed Intersections



As shown on Table 5-22, the following intersections and peak hours are predicted to operate at LOS F under Alternative 1:

- Ramps from I-695 at southbound South Capitol Street (AM);
- South Capitol Street at M Street SW - Southbound Intersection (AM);
- South Capitol Street at M Street SE - Northbound Intersection (AM and PM);
- M Street SE at 1st Street SE (PM);
- M Street SE at 8th Street SE (PM) (Ordinarily, this intersection would operate at LOS B and C during the AM and PM peak hours, respectively. During the time frame analyzed, the Clean Rivers Project on M Street SE would reduce the number of lanes to one in each direction due to construction.);
- M Street SE at 11th Street SE (PM) (this intersection would be modified by the 11th Street Bridges project); and
- Virginia Avenue SE at 3rd Street SE north of I-695 (PM).

Table 5-23 shows that the un-signalized intersections in the general vicinity of the LOD would operate very well under Alternative 1 (LOS A or B). Among the N/A intersections (full LOS cannot be calculated), all approaches would have acceptable LOS values except the southbound approach of 7th Street SE to M Street SE. This movement would operate at LOS F in both AM and PM peak hours.

Phase 1 of the MOT is divided into sub-phases A and B. As described in Section 4.15.2, the 11th Street Bridges project has already temporarily closed the I-695 on-ramp at 8th Street SE and the Southwest/Southeast Freeway ramp at 9th Street SE. When construction of the Project begins under a Phase 1A MOT condition, it is assumed that these ramps would still be closed. Phase 1B would begin when the 8th Street ramp is re-opened, although it would be aligned slightly differently on 8th Street SE. The traffic impact analyses, summarized in Table 5-23, included separate evaluations for each of these sub-phases.

As indicated on Table 5-22, the following signalized intersections would experience a change in conditions during the Phase 1A in comparison to Alternative 1 condition:

- M Street SE at 8th, 9th and 11th Streets SE;
- I-695 off-ramp at Virginia Avenue / 6th St SE;
- Virginia Avenue SE at 7th Street SE (south of I-695); and
- Virginia Avenue SE ramp at 8th Street SE (south of I-695).

All but two of these intersections (M Street SE/9th Street SE and I-695 off-ramp at 6th Street SE) would experience at least an LOS D (approaching unstable flow) during the peak hours. M Street SE at 8th Street SE and at 11th Street SE would have poor levels of service during at least one of the peak hour times. It should be noted that these delays would be caused by the Clean Rivers project, which as noted above would maintain only one lane in each direction on M Street SE during construction.

Table 5-23
Construction-Period Predicted Peak Hour Level-of-Service (and Overall Delay) at Selected
Un-Signalized Intersections in the General Vicinity of the Project

Loc*	Intersection	Alternative 1		Build Alternatives					
				Phase 1A		Phase 1B		Phase 2	
		AM	PM	AM	PM	AM	PM	AM	PM
A	M St SE at 7 th St SE*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
B	Virginia Avenue SE at 2 nd St SE	A (7.1)	A (6.9)	DNE	DNE	DNE	DNE	DNE	DNE
C	Virginia Ave SE at 3 rd St SE, South of I-695*	N/A	N/A	DNE	DNE	DNE	DNE	DNE	DNE
D	Virginia Ave SE at 4 th St SE, South of I-695*	N/A	N/A	DNE	DNE	DNE	DNE	DNE	DNE
E	Virginia Ave SE at 9 th St SE	A (7.2)	A (7.2)	DNE	DNE	DNE	DNE	DNE	DNE
F	G St SE at 4 th St SE	B (10)	A (9.8)	B (10)	A (9.8)	B (10)	A (9.8)	B (10)	A (9.8)
G	G St SE at 6 th St SE	B (12.6)	B (10.9)	B (12.6)	B (10.9)	B (12.6)	B (10.9)	C (21.2)	D (26.4)
H	G St SE at 7 th St SE	A (8.1)	A (9.5)	A (8.1)	A (9.5)	A (8.1)	A (9.5)	A (8.1)	A (9.9)
I	E St SE at 6 th St SE	B (11.7)	B (10.4)	B (11.7)	B (10.4)	B (11.7)	B (10.4)	C (15.8)	C (18.4)
J	D St SE at 6 th St SE	B (11.4)	B (10.8)	B (11.4)	B (10.8)	B (11.4)	B (10.8)	C (15.1)	C (20)

- Notes: * See Figure 5-8 for location of intersection
Numbers in parentheses represent overall intersection delay in seconds
N/A: The HCM procedures do not calculate an overall LOS for two-way stop controlled intersections
DNE: Does Not Exist; intersection does not exist during the MOT phase (crossings are provided)
Yellow cell indicates change from Alternative 1 or change from previous MOT phase
Blue cell indicates no change from previous MOT phase
Uncolored cell means that traffic conditions would be exactly the same as under Alternative 1

Although traffic conditions at the 6th Street off-ramp / Virginia Avenue SE intersection is predicted to worsen from LOS B to LOS C during both peak hours, this would not cause any queuing to extend onto the freeway due to the length of the ramp. This would remain unchanged as the MOT switches to a Phase 1B condition.

Traffic conditions at un-signalized intersections during Phase 1A would be operate at acceptable levels-of-service. However, the southbound approach to the M Street SE / 7th Street SE intersection would still operate at LOS F in both AM and PM peak hours.

During Phase 1B, the following signalized intersections would experience a change in conditions from Alternative 1 or Phase 1A:

- M Street SE at 8th and 9th Streets SE; and
- Virginia Avenue SE ramp at 8th Street SE.

The re-opening of the 8th Street ramp is predicted to change driver behavior by reducing volumes on M Street and increasing volumes at the Virginia Avenue SE ramp at 8th Street. The level-of-service is predicted to slightly improve at the M Street SE intersections with 8th and 9th Streets in comparison to the Phase 1A conditions, but would slightly worsen at the Virginia Avenue SE ramp at 8th Street.

The levels-of-service of the un-signalized intersections would be the same as those presented under Phase 1A because volumes at these intersections would not be affected by the re-opening of the 8th SE ramp.

During Phase 2, the following signalized intersections would experience a change in conditions from Phase 1B:

- M Street at 8th and 9th Streets SE (improved from Phase 1B conditions);
- I-695 off-ramp at Virginia Avenue / 6th St SE (improved from Phase 1B conditions);
- I-695 on-ramp at 8th Street SE (improved from Phase 1B conditions);
- I Street SE at 8th Street SE;
- I Street SE at Virginia Avenue SE WB/7th Street SE;
- I Street SE and Virginia Avenue SE WB at 6th Street SE; and
- G Street SE at 8th Street SE.

In MOT Phase 2, the remaining sections on Virginia Avenue SE between 5th and 8th Streets SE, on the south side of I-695, would be closed. All traffic from the 6th Street off-ramp would be diverted to the intersection of Virginia Avenue SE and 6th Street SE on north side of I-695, and Virginia Avenue SE on the north side of I-695 would be converted to two-way operation between 6th and 8th Streets SE. Before Phase 2 starts, it is assumed that the Clean Rivers project on M Street SE would be completed, and therefore, better traffic conditions are predicted along M Street SE than under Phase 1.

Of the seven intersections predicted to have different traffic conditions in Phase 2 in comparison to Phase 1B or Alternative 1, the intersections on I Street SE at 6th, 7th and 8th

Streets SE are predicted to operate at up to LOS E traffic conditions during the peak hours. These predicted traffic conditions are due to the diversion of freeway traffic and the conversion of this street to two-way operations during the Phase 2 MOT. The diversion would affect the G Street SE and 8th Street SE intersection, but the operation of this intersection would still operate fairly well (LOS B during both AM and PM peak hours).

The affected I Street SE intersections predicted to operate poorly were further analyzed to determine if signal optimization could improve their conditions. As a result, it appears that implementation of signal optimization along the three I Street SE intersections predicted to operate poorly could decrease wait time and improve level-of-service. For example, at the intersection of I Street SE and 8th Street SE, the AM peak hour delay could be reduced by approximately 20 seconds, leading an improvement from LOS D to a LOS B. At the intersection of I Street SE/Virginia Avenue SE and 7th Street SE, AM peak hour delay could be reduced by approximately 45 seconds, leading to change of LOS E to LOS A. The optimization potential of the I Street SE/Virginia Avenue SE and 6th Street SE intersection would not be as great as the other two. Overall delay could be reduced by a few seconds, but the overall level of service would not change.

5.15.3.2 Post Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in disruptions to traffic as parts of roadways over the affected tunnel are closed to allow the repairs. Emergency MOT plans would be implemented to maintain mobility in the community. Nevertheless, the operation of Virginia Avenue Tunnel would not affect traffic conditions in the general vicinity of the rebuilt tunnel.

As described in Section 3.3.2.2, Virginia Avenue SE would be restored to at least its pre-construction condition. Therefore, similar to Alternative 1, no long term effects to traffic conditions in the general vicinity of the rebuilt tunnel would occur.

If desired by stakeholders, this Project could include changes to post-construction Virginia Avenue SE. Through coordination with DDOT and for the purposes of analyzing post-construction impacts of these changes, it is assumed that the number of lanes on Virginia Avenue SE between 6th and 8th Streets would be reduced from four to three and that two-way traffic would be provided between 8th and 9th Streets SE. The effect of these changes on Virginia Avenue SE to traffic conditions immediately after construction (2016) and in the year 2040 (roughly 25 years after Project completion) is shown on Table 5-24.

Regardless of the configuration on Virginia Avenue (Alternative 1 or Build Alternative with the restored streetscape), traffic flow would be acceptable in the years immediately following construction. In general, traffic should return to previous levels or better after the completion of the Project. However, by 2040, projected traffic volumes would increase substantially due to projected and planned development in the region. As a consequence, traffic conditions along these intersections are predicted to degrade regardless of which Alternative is ultimately adopted.

Table 5-24
Post-Construction Predicted Peak Hour Level-of-Service (and Overall Delay) at
Signalized Intersections along Virginia Avenue SE

Loc*	Intersection	Alternative 1 (2016)		Build Alternative (2016)		Alternative 1 (2040)		Build Alternative (2040)	
		AM	PM	AM	PM	AM	PM	AM	PM
14	I-695 off-ramp at 6 th St SE/Virginia Ave SE (south of I-695)	B (17.6)	B (11.5)	B (19.4)	B (18.3)	F (132.4)	D (47.4)	F (137.3)	E (55)
15	Virginia Ave SE at 7 th St SE (south of I-695)	A (6.2)	B (17.7)	A (6.3)	B (19.6)	A (6)	C (34.3)	B (19.4)	E (60.2)
16	Virginia Ave SE at 8 th St SE (south of I-695)	C (32.1)	D (47.3)	C (31.7)	C (31.5)	C (23.2)	E (70.7)	B (17.4)	D (41.9)
17	Virginia Ave SE ramp at 8 th St SE (south of I-695)	B (12)	B (15.4)	A (7.9)	A (6.3)	B (12.6)	D (44.8)	B (18.1)	D (37)

Notes: * See Figure 5-8 for location of intersection
Numbers in parentheses represent overall intersection delay in seconds

5.15.3.3 Mitigation Measures

During final design, the results of further signal optimization analysis would be employed to study improved intersection conditions as an element of implementation of the MOT. Also during final design, the MOT plan would be subject to value engineering and additional coordination with DDOT to determine if traffic impacts could be improved than what is herein predicted.

Based on additional studies and working closely with DDOT, temporary traffic signal timing schemes would be employed along the westbound Virginia Avenue SE / I Street SE during the Phase 2 MOT, which would be affected by converting this street between 6th and 8th Streets into two-way operations. Temporary traffic signals would be installed for eastbound traffic. The optimization analysis indicates some improvements in traffic conditions at the three affected intersections. These intersections would be monitored at the beginning of the Phase 2 MOT to determine the effectiveness of the optimization schemes.

Other measures that may mitigate some of the traffic impacts include:

- Incentivizing the use of public transportation for construction workers;
- Although off-street parking would be provided for construction workers at the west staging area (New Jersey Yard), parking preferences would be provided for those construction workers who carpool;
- Minimizing the use of haul routes and traffic detours going through residential neighborhoods;
- Not allowing work activities within the construction work zone without first setting up approved traffic control measures in accordance with the approved MOT plan;
- In situations where traffic must be maintained through part of a construction work zone, assigning an inspector trained in traffic control to monitor the traffic and be allowed to recommend changes to the MOT plan; and
- Maintaining records of the MOT management that would include when specific traffic control devices are placed and removed, inspection reports, and traffic crashes and injuries where traffic control devices are in place; and
- Monitoring traffic conditions throughout construction, and if necessary, make the adjustments to the MOT (e.g., signal timing) in coordination with DDOT.

5.15.4 Parking

5.15.4.1 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 would not result in parking impacts. The discussion provided in the Construction Impact section for Parking focuses exclusively on the three Build Alternatives, which would have the same impacts to parking.

The closure of Virginia Avenue SE for construction of the Project and the MOT would require the temporary displacement of on-street parking. A breakdown and the locations of the displaced parking are provided in Table 5-25. During Phase 1 of the MOT, 57 on-street parking spaces on Virginia Avenue SE would be displaced for the duration of construction because of the closure of the street. The majority of these are two-hour spaces fronting the new District government offices at 200 I Street SE and Capitol Quarters between 3rd and 5th Streets SE. Capitol Quarter provides off-street parking for most its residents, but it is conceivable that some residents may use the two-hour residential parking on Virginia Avenue SE. In addition, this parking could be used by repair and tradesmen providing services to nearby residences. Residents and service providers could park along the north-south cross streets or the parallel streets to Virginia Avenue SE, which would be unaffected by the LOD. However, this would result in higher demand for the remaining on-street parking.

Table 5-25
Parking Displacements by Location and MOT Phase

Location	MOT Phase 1	MOT Phase 2
Eastbound Virginia Avenue SE (south of I-695)		
200 Block (north side)	13	13
300 Block (south side)	6	6
300 Block (north side)	14	14
400 Block (south side)	3	3
400 Block (north side)	11	11
800 Block (north side)	10	10
Westbound I St SE / Virginia Ave SE (north of I-695)		
500 Block (north side)		10
600 Block (north side)		20
700 Block (south side)		10
700 Block (north side)		8
Total	57	105

In Phase 2, 48 additional parking spaces would be displaced for the remaining duration of construction. These 48 spaces are located on the westbound I Street SE / Virginia Avenue SE between 6th and 8th Streets SE, and would be displaced because of the Phase 2 MOT's conversion of this street to two-way operations. These spaces are two-hour metered parking. The south side parking within the 700 block is not allowed during peak periods. Many of these spaces, especially those near 8th Street SE, appear to be used by patrons to Barracks Row. The potential impacts of these parking displacements are included in Section 5.4.1

The Project proponent would compensate the District for losses of parking revenue during construction.

Construction workers would not be allowed to park in areas covered by the DDOT public space permit, nor would they be allowed to park on public streets (the streets surrounding the LOD are either metered or are two-hour residential spaces). Based on a preliminary site utilization plan for the west staging area (New Jersey Yard), a minimum of 90 parking spaces would be available for construction personnel. Although the total number of construction personnel on any given day would exceed this number, construction staff would be incentivized to car pool. In addition, the LOD is well served by public transportation, which includes two nearby Metrorail stations (Eastern Market and Navy Yard) and a number of Metrobus and DC Circulator routes (see Section 4.15.6). It is expected that many construction personnel would use public transit to travel to and from work.

5.15.4.2 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in potentially similar impacts described under the Construction Impacts for the Build Alternatives. Nevertheless, no long-term impacts to parking are anticipated to occur as a result of Alternative 1.

After construction of the any of the Build Alternatives, the on-street parking spaces would be restored, and there is the possibility that additional on-street parking could be provided if desired by stakeholders.

5.15.4.3 Mitigation Measures

Temporary wayfinding signs would be provided as part of the MOT to direct motorists to available off-street parking, which include the parking lot underneath I-695 on 8th Street SE. This particular parking lot is near Barracks Row. Other nearby off-street parking lots are located on L Street SE and 3rd Street SE. These lots are two to three blocks south of Virginia Avenue SE.

As described above, a minimum of 90 parking spaces would be provided within the west staging area (New Jersey Yard) for construction workers. Parking preferences would be given to those construction personnel who carpool. Construction workers would be prohibited from parking at metered or are two-hour residential spaces.

5.15.5 Pedestrian and Bicycle Facilities

5.15.5.1 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 would not result in impacts to pedestrian and bicycling facilities. The discussion provided in the Construction Impact section for Pedestrian and Bicycling Facilities focuses exclusively on the three Build Alternatives, which would have the same impacts.

During construction, pedestrians and cyclists would not be allowed to travel along Virginia Avenue SE under any of the Build Alternatives. The MOT plan includes provisions for pedestrian and cyclists. The temporary decking structures crossing Virginia Avenue SE would

accommodate north-south pedestrian and cyclist movements. These crossings over the temporary bridges would meet appropriate engineering and Americans with Disabilities Act (ADA) standards for the safe passage of cyclists and pedestrians, including those who are wheelchair dependent, and designed in accordance with the Highway Capacity Manual. Pedestrians and cyclists wishing to travel east-west would be directed to alternative parallel streets on I, K, and L Streets SE. Safe, accessible, and convenient alternative access routes would be maintained to allow pedestrians to reach bus stops, crosswalks, sidewalks, and other origins and destinations surrounding the LOD. As noted in Section 5.12.1, those wishing to access Garfield Park from 2nd Street SE, beneath I-695, would be directed to either New Jersey Avenue SE or 3rd Street SE.

Physical separation structures, such as concrete barriers and fencing, would be provided between construction zones and sidewalks to provide a safe environment for pedestrians and cyclists. Adequate temporary signage and markings would be in place to control safe movement around construction vehicle access points. Flaggers, temporary traffic signals or other appropriate traffic control measures would be in place to control the safe operation of construction vehicles as they are leaving and entering construction zones.

During Phase 1 of the MOT when a single-lane would be provided along Virginia Avenue SE between I-695 off-ramp and 8th Street SE, traffic signal timing would be maintained to allow pedestrians to cross Virginia Avenue SE as they do under existing conditions.

5.15.5.2 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in potentially similar impacts described under the Construction Impacts for the Build Alternatives. Nevertheless, no long-term impacts to parking are anticipated to occur as a result of Alternative 1.

At the conclusion of construction of the Project, pedestrian and cycling facilities movements would resume to existing conditions. However, if desired by stakeholders, the Project could provide bicycle facilities (e.g., bike lane or shared-use bike path) along Virginia Avenue, connecting with Garfield Park with Virginia Avenue Park. At minimum, sidewalks would be fully restored to pre-construction conditions. Additional pedestrian facilities, usable by those who are wheel-chair dependent, may be provided along sections of roadways that currently lack pedestrian facilities, such as along certain north side blocks of Virginia Avenue SE.

5.15.5.3 Mitigation Measures

In addition to addressing the impacts to vehicular traffic, the MOT plan was also developed to ensure the safe and convenient passage of pedestrians and cyclists through the LOD during construction. Provisions would be made so that pedestrians and cyclists would be able to cross the construction area on Virginia Avenue SE at each cross street between 3rd and 8th Streets SE. Temporary wayfinding signs for certain facilities would be provided if necessary (e.g., alternatives for accessing Garfield Park from 2nd Street SE). Although east-west movements

would be limited on Virginia Avenue SE, parallel detours would be established, including temporary wayfinding signs.

In the long-term and as a community benefit, the Project would provide an east-west pedestrian / bicycle connector link between Garfield Park and Virginia Avenue Park if DDOT desires to include a bike facility on Virginia Avenue SE between 2nd and 9th Streets as part of restoring the street after construction. This connector link may be identified as a bike corridor by DDOT.

5.15.6 Transit Facilities and Services

5.15.6.1 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 would not result in impacts to transit facilities and services. The discussion provided in the Construction Impact section for Transit Facilities and Services focuses exclusively on the three Build Alternatives, which would have the same impacts.

Several Metrobus and two DC Circulator routes cross Virginia Avenue SE along 8th Street SE. Three additional Metrobus routes use 11th Street SE when crossing the LOD. As discussed previously, the north-south roads would remain open during construction, including 8th and 11th Streets SE. Therefore no bus route would be subject to rerouting due to the Project.

5.15.6.2 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could potentially affect transit movements. But, if necessary, provisions could be made to maintain service similar to how the Build Alternatives would maintain service during construction.

At the conclusion of construction of the Project, Metrobus and DC Circulator movements would return to pre-existing conditions—the temporary need to cross Virginia Avenue SE over temporary bridge decking would no longer exist.

5.15.6.3 Mitigation Measures

No mitigation measures are required.

5.16 Energy

Section 5.21 discloses the irreversible and irretrievable commitment of energy resources in the construction of the Project. Given the size and scale of the Project, the amount expected energy use during construction would not be considered excessive or unusual.

As noted in Section 5.15.1, total U. S. freight shipments are expected to grow substantially over the next decades in part due to the opening of expanded Panama Canal in 2015. It is therefore

expected that freight traffic along the east coast of the U.S. is due for substantial growth as well. The ability to accommodate growth in freight transportation by rail as opposed to other modes, in particular trucking, would have long term energy implications as freight rail transportation is about three times more fuel efficient than freight trucking transportation according to the Texas Transportation Institute. In comparison to Alternative 1, any of the Build Alternatives would allow CSX the ability to operate double-stack intermodal container trains throughout substantial portions of its eastern seaboard freight rail network. In addition to increasing the capacity for this particular freight transportation market, the ability to double-stack intermodal containers provides energy benefits through even greater fuel efficiencies above what freight rail transportation already provides in comparison to trucking. Although less substantial, providing two railroad tracks within Virginia Avenue Tunnel also provides energy saving benefits from reducing the overall time trains spend idling while waiting for an opposite moving train to clear the tunnel.

5.17 Indirect Effects

According to 40 CFR 1508.8, indirect effects are impacts that have the potential to occur “later in time or farther removed in distance, but are still reasonably foreseeable [and] may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.”

As noted in Section 5.1, the rebuilt Virginia Avenue Tunnel under any of the Build Alternatives would become as inconspicuous as it is today from the larger community. The Build Alternatives are not expected to have any indirect effects to the surrounding community primarily because the Project is essentially rebuilding existing infrastructure. The effects of Virginia Avenue Tunnel have already occurred, and are reflected in the existing environmental conditions described throughout Chapter 4. Upon completion of the Project, Virginia Avenue SE and surrounding areas would revert back to these environmental conditions.

Alternative 1 is also not expected to have any indirect effects to the surrounding community in the near future. However, doing nothing today carries risks into the future that at some point a section of tunnel would fail and would require emergency repairs. When such an event happens, the indirect effects could include disruption to the larger community. Associated construction impacts would also occur, but such effects would happen in an unplanned or emergency fashion. Because it cannot be reliably predicted when a major repair would be needed, the timing and nature of these effects also cannot be reliably predicted.

5.18 Cumulative Impacts

A cumulative impact, according to 40 CFR 1580.7, is defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions.” According to FHWA, a cumulative impact includes the total effect on a natural

resource, ecosystem, or human community, and the total of all impacts to a particular resource that have occurred, are occurring, and would likely occur as a result of past, present, and future activities or actions of federal, non-federal, public and private entities.

The following activities are currently taking place or would be conducted in the near future in the general vicinity of the LOD:

- 11th Street Bridges project (currently under construction);
- South Capitol Street Corridor Project, including a new Frederick Douglass Memorial Bridge;
- Clean Rivers Project, a multi-billion dollar effort by DC Water, which would include a combined sewer overflow (CSO) tunnel under the Anacostia River, but also includes diversion tunnel beneath M Street SE (currently under construction);
- Garfield-Canal Park Connector, which would establish a pedestrian and bicycle connection linking Garfield Park and Canal Park;
- Southeast Boulevard, which would convert the segment of the Southeast Freeway from 11th Street Bridge to Barney Circle to an urban boulevard;
- Relocation of Marine Corps Enlisted Bachelors Quarters (Building 20); and
- Anacostia Waterfront Initiatives, such as the Southeast Federal Center and Capper Carrollsburg Hope VI Redevelopments.

Discussion of the expected cumulative impacts as they relate to pertinent environmental issues is provided below.

Transportation

The Project is located in proximity to a number of construction projects, notably two very important infrastructure projects--11th Street Bridges project and the Clean Rivers Project, which includes construction of a diversion sewer tunnel beneath M Street SE. Other projects relate to land use development, such as the 200 I Street office building. The land use developments would eventually affect traffic generation in the general vicinity of the Project. The infrastructure projects affect traffic patterns, such as what the 11th Street Bridges project has done (e.g., close the ramp to Martin Luther King Avenue SE) and would continue to do so as construction of this project progresses. The Project's MOT plan and traffic impact analysis conducted for the Project and presented in Section 5.15.3 have taken into account these other projects. For example, existing traffic generation zones in the general vicinity of the project were modified to include completion of developments. In addition, the Project's MOT plan has incorporated the 11th Street Bridges project's ramp closures at 8th and 9th Streets SE. In summary, the traffic impact analysis presented in Section 5.15.3 has already taken a cumulative perspective to predict traffic conditions during the construction of the Project.

Land Use

Various plans for Capitol Hill and the Barracks Row/ Eight Street Corridor intend to keep these areas vibrant without any notable changes in development. However, the Capitol Riverfront is

developing into a vibrant mixed-use higher-density district. These land use plans are expected to continue regardless of whether the Project proceeds or not.

Socio-Economic Conditions

There is no evidence that construction of the 11th Street Bridges project and other construction projects in the general vicinity of the LOD have adversely affected the socio-economic conditions of Capitol Hill or the Capitol Riverfront. This may be in part due to the 11th Street Bridges project's MOT plan to maintain mobility throughout the community during construction of this project. The Project also includes an MOT plan, in coordination with the 11th Street Bridges project, which would maintain mobility in the community. Notwithstanding some displacements of on-street parking near Barracks Row, the Project would not affect businesses or community services.

Air Quality

The Project along with 11th Street Bridges project and other transportation projects in the general vicinity of the Project, such as the South Capitol Street Corridor bridge reconstruction and the conversion of the Southeast Freeway into the boulevard, are identified in the CLRP or the TIP, which were approved by the TPB in July 2012. The air quality impacts of these projects are cumulatively accounted for in the approved SIP, which includes the Air Quality Conformity Report demonstrating that the mobile source emissions from the TIP projects adhere to all emissions ceilings of the EPA. As described in Section 5.5, the Project would not trigger the GC Rule's *de minimis* emission thresholds in either construction or post-construction conditions. The other projects in the general vicinity of the LOD would also not jeopardize the National Capital Interstate Air Quality Control Region's objectives in meeting the NAAQS.

Noise

As noted in Section 4.6, the ambient noise conditions at and near the LOD are mostly influenced by traffic noise coming from I-695. The noise conditions on the east end of the LOD did not appear to be influenced by construction from the 11th Street Bridges project. At the conclusion of the Project's construction, the ambient noise would return to pre-construction conditions.

Water Resources

The DC Water's Clean Rivers Project seeks to improve the water quality of the Anacostia and Potomac Rivers. A substantial percentage of the District's stormwater system is combined with the sewer system. During heavy rain the combined sewer system could become overloaded and untreated sewage could be discharged into the Anacostia and Potomac Rivers. The purpose of the Clean Rivers Project is to construct CSO tunnels to capture this overflow, store it until after the storm event, and release the water gradually into the treatment system. Stormwater from the restored Virginia Avenue SE (after construction of the Project) and other projects in the general vicinity would be directed to DC Water's CSO system.

Biological Resources

The area surrounding the LOD is an urban environment, with no notable biological resources. The Project would not change this condition and neither would any of the other projects in the general vicinity.

Historic Resources

The area surrounding the LOD includes a number of historic properties and resources, such as the Capitol Hill Historic District, the Navy Yard Historic District and many individually historic buildings, such as the Marine Commandant's House and the Old Naval Hospital on Pennsylvania Avenue, SE. The Project would require the demolition of the existing Virginia Avenue Tunnel, which is eligible for the National Register. Because of this and other construction-period impacts, it is anticipated that an adverse effect determination would be rendered by FHWA in accordance with Section 106 (see Section 5.11). Construction-period impacts to other historic properties, such as the L'Enfant Plan (due to construction on a L'Enfant identified street, Virginia Avenue SE) and Capitol Hill Historic District (due to construction in Virginia Avenue Park) would be temporary. The other projects noted previously (e.g., 11th Street Bridges, Clean Rivers on M Street, etc.) are generally not expected to cause adverse effects to historic properties in Capitol Hill.

Visual and Aesthetic Resources

In general, the Project and the projects in the general vicinity would not change the overall visual and aesthetic appearance of Capitol Hill and the Capitol Riverfront. The 11th Street Bridges project would probably present the greatest visual change simply because it will be replacing the old bridge with more prominent structures and embankments. However, aesthetics are being taken into account in the architecture of the structures. The Southeast Boulevard project has the potential to substantially improve the visual and aesthetic conditions of Capitol Hill. It would convert a freeway, which many perceive as unattractive, into an urban boulevard with street trees and other visual amenities. This project would also provide opportunities to connect Capitol Hill with the waterfront east of 11th Street SE.

In summary, the Project Alternatives (including Alternative 1) are not expected to cause or contribute to adverse cumulative impacts to the surrounding community. With so many projects being completed and under construction within the same time frame, there is the concern that combined traffic impacts could cause congested conditions in the neighborhoods surrounding the LOD. Therefore, the MOT plan prepared for the Project and the traffic impact analysis took into account the other projects, either by including their traffic generation or MOT plans. The conclusion of the traffic impact analysis as provided in Section 5.15.3 is that mobility in the surrounding community would be maintained. Although peak hour congestion is predicted at certain intersections, traffic signal optimization could be used to effectively relieve these congestion points. Other impacts are expected to be localized within the LOD and to not contribute to the cumulative impacts from other projects.

5.19 Permits and Approvals

Permits would be required for construction of the Build Alternatives. These authorizations ensure that proper coordination pursuant to federal and District legislation has been satisfied. The anticipated permits, if applicable, include:

National Park Service

- Approval associated with construction activities within Virginia Avenue Park

U.S. Environmental Protection Agency, Region III

- NPDES stormwater Permit for Construction Activities

U.S. Marine Corps

- Approval associated with construction activities within the Marine Corps Recreation Facility
- Approval associated with the location of the reconstructed tunnel under Alternative 3 and any relocated utilities within the Marine Corps Recreation Facility

DC Department of Consumer and Regulatory Affairs

- Building Permit
- Raze Permit
- Excavation/Sheeting and Shoring Service Permit
- Electrical Permit/Supplemental Systems Installation Permit

DC Department of Environment

- Dewatering/Groundwater Discharge Permit
- Stormwater Management Permit
- Air Quality Permit

District Department of Transportation

- Public Space Permit
- Tree Removal Permit
- Design and construction plan approvals
- MOT and Construction phasing approval
- Occupancy Permit

5.20 Relationship of Local Short-Term Uses vs. Long-Term Productivity

The Project would involve trade-offs between short-term environmental impacts associated with construction-period impacts and the long-term transportation and economic gains achieved by having a rebuilt Virginia Avenue Tunnel. However, the long-term productivity of the Project would offset the short term uses.

Construction-period impacts would be a nuisance and disruptive to the surrounding community, but such impacts would soon disappear upon completion of the Project.

Long-term conditions of the Project include:

- A rebuilt Virginia Avenue Tunnel that would last at least a century or more with routine maintenance;
- Elimination of the bottleneck at the Virginia Avenue Tunnel, which currently affects regional freight operations of the Mid-Atlantic and Midwest regions;
- Greater freight transportation efficiencies from the ability to operate double-stack intermodal container trains along much of the eastern seaboard freight rail network;
- Improved energy savings and subsequent reductions in GHG emissions; and
- A new, improved Virginia Avenue SE streetscape to benefit the community and meet the needs of the District and the surrounding community.

Considering the long-term productive uses listed above, and the fact that adverse construction impacts are temporary and would be minimized or mitigated, the Project appears beneficial to the District, the region and the nation.

5.21 Irreversible and Irretrievable Commitment of Resources

The Project would require an irreversible and irretrievable commitment of following physical and human resources:

- The existing historic Virginia Avenue Tunnel would be demolished;
- Equipment would be devoted to the construction of the Project, which cannot be used for other projects;
- Considerable amounts of fossil fuels would be expended, and a wide variety of both manmade and natural construction materials would be committed; and
- Considerable amounts of labor would be committed for management, planning, government and regulatory oversight, engineering design, purchasing and services, and construction.

The benefits of the Project, which include replacing an important, but aged, piece of infrastructure with a modern facility that would meet the freight rail transportation needs of the 21st Century, outweigh the commitment of the resources noted above.